JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

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VOL. LXXIX., No. 2019.—TUESDAY, JANUARY 21, 1902.

EDITORIAL NOTES.

Progress with the Paris Gas Question.

In continuation of our notice of the interesting proceedings of the Paris Municipal Authorities in regard to the gas question, we are able this week to state that, after long and tempestuous sittings, mostly consumed in irrelevant disputations, the Council took a vote on what we should term the "preamble" of the Committee's report, which was carried by a narrow majority of 5 in a chamber of 77. That is to say, the Municipal Council decided in favour of the proposal which we explained, and in general commended, last week. The next business was the discussion of the clauses, upwards of 200 in number, which together constituted the project of the Committee known by the name of the reporter, M. Spronck. Before this conclusion was reached, however, the Prefect of the Seine had disclosed the views of the Government, which, remarkable to relate, did not favour the principle of the Spronck report. How the business will really end must therefore be regarded as doubtful until some positive effect has been given to the decisions in the case. Meanwhile, the deliberate judgment of the Prefect is worth recording.

The Government view is that the present majority of the Municipal Council were wrong, very wrong, in summarily rejecting, as they did the other night, the method of direct control of the gas supply. Not that the Prefect was personally enthusiastic on the point of direct control—far from it, indeed; but this is precisely one of that category of serious propositions which ought not to be dashed aside without a second thought, out of prejudice. Having thus scolded the Municipal Council for acting irrationally, the Prefect criticized the Spronck report in all its bearings, and demolished it with the utmost courtesy of expression. He declared that at the municipal elections the question of reducing the price of gas was agitated in such a way as to falsify the issue. There are two sides to the question, which ought not to be confused. It would have been wise not to give the public any pledge to reduce the price immediately, but to set apart the money such reduction must cost to make a fund for buying out the Gas Company at the end of their Treaty. This would have left the Municipality with an unencumbered gas undertaking, which they could have dealt with at pleasure. Since the reduction had been promised, however, it could only be effected by reimbursing the Company for the loss of revenue entailed, or by paying to the consumers, out of the City funds, the amount of the promised reduction of their gas bills. For his part, said the Prefect, he thought the Council were in too great a hurry to take up the gas question.

Still, if they must do it, the Government thought it would be better to go directly to the Company with the following proposals: It is assumed that the part of the undertaking the City is to come in for in 1906 is worth 100,000,000 frs. On the other hand, it will take just 100,000,000 frs. to lower the price of gas from 30 to 20 centimes per cubic metre between now and 1906. The City gives up its claim to this share (a moiety of the value of the works and plant), in return for which the Company immediately drop the price of gas to 20 centimes. This fulfils the municipal councillors' pledge. For the rest, the Company would have the concession for twenty years from 1906, paying to the City meanwhile a redemption charge of 6·5c. per cubic metre (about 1s. 6d. per 1000 cubic feet), and rent the distributing plant, which will then be the property of the City, at 1,000,000 frs. per annum. The Company would further be placed under an obligation to make provision for the pensioning of the employees, and give them a share of the profits. The shareholders would benefit by the arrangement; while the City would not have to disburse anything. The capital of the Company would be increased by a loan of 120,000,000 frs.—100,000,000 frs. to compensate for the half-share of the investment which would now remain undisturbed (as the City would not liquidate its engagements with the Company at the end of the Treaty), and the balance for developing the Landy works. Lastly, the future would not be engaged for more than twenty years, instead of fifty as proposed by the Committee, and no new legislative sanction would be required.

Seductive as the official solution of the puzzle undoubtedly is, it failed to attract the good municipal councillors, who could not reconcile themselves to the notion of beginning to negotiate with the Company all over again. They did not attempt to answer the Prefect; but went home to dinner as soon as he had finished his oration. On reassembling later, M. Sauton defended the Spronck report against the condemnation of the Prefect; and the vote on the principle of this scheme, already recorded, was carried at midnight. It seems a pity that the forms of business permitted of the springing of so important a suggestion as that of the Prefect before a popular Chamber assuredly not qualified to give a just decision off-hand on the merits of the alternative schemes.

The Turning in the Welsbach Lane.

The shareholders of the Welsbach Company have pronounced judgment on the administration of their affairs; and the administration stands severely condemned. From the verdict there is no appeal for the Directors; the shareholders being almost unanimous in their decision. The issue put before the latter was clear. On the one hand they had before them the report and recommendations of the half-a-dozen gentlemen appointed as an Advisory Committee. These gentlemen represented the choice—at the time of election—of both shareholders and Directors. All of them are men of reputation in public, business, and financial affairs; and their integrity is unimpeachable. They went to their work unprejudiced; and at the outset of the inquiry, it is apparent their relations with the Directors were of the most friendly character. On the other hand, the shareholders had the reply of the Directors (which was manifestly framed in an impassioned state of mind), a supplementary statement by Mr. Julius Moeller drawn up for the express purpose of enabling them to form an "independent" judgment, the financial results of the past administration of their affairs, and the public estimation of the value of their holdings in the concern. Again, there was no question as to the integrity individually of the Directors; but the charge against them was mismanagement, and that of a reckless order. The plain question therefore was: Had the direction shown incapacity, or had they not. The printed indictment and defences had been in the hands of the shareholders long enough for calm and judicious consideration before becoming involved in the feverish excitement of a large meeting; and their deliberate view was that the Directors had proved, by their acts, that they were unfitted for the management of the concern. The assemblage of Welsbach shareholders last Wednesday was the largest that has ever been drawn together; and out of that large gathering only a dozen hands were held up in favour of the rejection of the Committee's report and recommendations. What a verdict! The very fact that the Directors accepted the vote there and then as conclusive, without calling for a poll, showed which side possessed the master-hand in the matter of proxies.

Sir Henry Burdett, as Chairman of the Board, made a brave stand against long odds. But there were too many hard facts opposed to the making of an effective impression; and sentimentalism had no softening influence upon shareholders wearied of waiting for better things. A one-time promising concern eaten away to the bone, assets diminishing in value, and a capital depreciated almost to nihility were more than enough to steel the hearts of the most susceptible shareholders against pointed and finely phrased appeal. Talking to doomsday would not convince those who put their money into the concern in the hope of receiving a return for it—some, the Committee tell us, through confidence in the judgment of the Chairman—that such a condition as the present has been brought about by good

and efficient management. And therefore there is no ground for surprise that the disappointed shareholders should desire to see their property confided to other hands, an extravagant system brought down to a reasonable level, and the business run on methods of a broad and intelligent order; for truly certain of the past Welsbach methods have wholly passed the comprehension of many outside the confidence of the Board. While all that has been lost cannot now possibly be retrieved, we feel some assurance in predicting that, if the recommendations of the Advisory Committee are consummated by the shareholders in the resolute spirit with which they have been made, a strong business will be built up from which profit will be derived.

There are two or three incidents of Wednesday's meeting upon which we will lightly touch. Sir Henry Burdett once more asserted that, through the publication of the Committee's report, the business has been injured, owing to the wholesale houses refusing to stock the goods in the expectation of lower prices. But surely it must be unnecessary to remind Sir Henry of three things, to prove, granting a temporary injury, that it will right itself: First, that some little time must expire before the Committee's recommendations can be fully acted upon; secondly, that the demand of the public will compel purchase by dealers; and, thirdly, that when the lower prices come about, there will be a greater demand, and some of the business (not inconsiderable in bulk) which now flows into competing channels will be diverted to the Welsbach Company. This is a case in which it is better to suffer an acute trouble than a chronic one. But an inability to read the signs of the times, look to the future, and prepare for coming events, has been one of the failings of the direction of the Welsbach Company.

Of a piece with the Board's tardiness in recognizing the effect of cheaper goods on the stability of the concern in the future, is their insensate action in opposing a closer alliance with the gas industry. This they persisted in even as the power of direction was falling out of their grasp. Sir Henry Burdett, at the meeting, tried to make capital out of an affidavit by Mr. George Livesey in favour of a competing manufacturer of mantles, in which affidavit the statement is made that mantles ought to be purchasable for 3d. While no one can compel the Welsbach Company to reduce their mantles to that figure, Mr. Livesey was not speaking without authority; and Sir Henry was careful not to inform the shareholders that the makers of the Welsbach type of mantles in Germany find it to their advantage to sell at something near the price named. When open competition arrives in this country, if a mantle is offered as good in quality as the Welsbach at the price of 3d., surely Sir Henry and his colleagues do not suppose that the public and the gas companies are going to be so insensible to their own interests, or so silly, as to pay a higher price to have the privilege of dealing with the Welsbach Company.

Commenting on one of the remarks which we recently made regarding this question of a more intimate association with the gas industry, a financial paper (which has, for reasons not far to seek, taken upon itself the defence of the Welsbach policy) makes this wise observation: "The point of "importance to Welsbach shareholders is that the gas com- "panies need the Welsbach quite as much as the Welsbach "can need them, and that therefore it is impolitic of the "Welsbach to make rash advances to the gas companies." This is another example of contracted vision. Will it always be that the gas companies will need the Welsbach? And is it an absolute fact that some of the companies find even now that they need the Welsbach quite as much as the Welsbach can need them? We have information which permits us to entertain a contrary view. But the new conditions proposed by the Advisory Committee will bring about a change in the relationship, and that relationship will grow more profitable to the Welsbach Company year by year. Mr. Stanhope is informed on good authority that only 15 per cent. of the gas used for lighting in this country is consumed through incandescent burners; while the proportion in Continental countries varies from 80 to 90 per cent. What have the traders and the Directors been doing for the Welsbach Company that the percentage of users is so small in this country? Will Sir Henry Burdett answer that? If 15 per cent. is the best they could accomplish, then the sooner the Company can get the gas industry to bring its strength to their aid, the better it will clearly be for the concern.

We have already commented on Wednesday's proceedings to a greater length than intended; and yet there are several other points which present themselves for criticism, among them the fresh allegations of mismanagement which raised the ire of the shareholders against the Board's vaunted perspicacious methods of conducting their affairs. Our only regret is that the shareholders did not bear with Sir Henry a little more towards the close, to hear to the full his explanation concerning these matters. However, the vote adopting the Advisory Committee's report, including the recommendation that the administration of the concern be transferred to a new Board, was conclusive. But the Directors declined to follow what would have been, under the circumstances, the most dignified procedure—viz., to tender there and then their resignations. We are told by the financial organ already referred to that "there is no obliga- "tion on the Directors to facilitate the accession of the "Committee to office—provisional or otherwise." Paltry, but true. In the facilitating, however, there would have been honour; in dismissal, there will be none.

It is suggested in an evening contemporary that possibly the cause of the reluctant compliance of the Board with the shareholders' unmistakable desire that they should vacate office "may be found in the contracts entered into by the "Chairman and other Directors with the Company (and "which have still some years to run) having been so framed "that nothing but voluntary resignation can terminate "them." We have no absolute knowledge at the moment as to the existence of these suggested contracts; but this we do know, that at the time Mr. Bethell, one of the late Directors, was asked to resign there was no question as to a contract affecting him, and evidently Mr. Bethell is not cognizant of anything which can prevent the shareholders compelling the abandonment of office by Sir Henry Burdett, as, just previous to the recent meeting, a published letter by Mr. Bethell expressed his view that the dismissal of Sir Henry was an absolute necessity. Besides this, we have the declaration which Sir Henry himself made to the shareholders in 1900: "I desire to say emphatically that I should "decline to hold office one moment longer than it is the wish "and desire of the shareholders, as a body, expressed at a "properly constituted meeting, that I should do." Contracts or no contracts, after the conclusive vote last Wednesday, we cannot conceive that any Board of Directors would entertain for a moment a desire to cling to office after being so plainly told that the shareholders had lost confidence in them. It is perhaps inadvisable to say more on this personal side of the question until there is a definite development; and the sooner there is one, the better will it be for all concerned. It would be a pity if the Directors allowed their accusation against the Committee of having hampered the carrying on of the business to recoil on themselves.

"Quo Vadis?"

It is a matter of impossibility to reproduce in our columns anything approaching to a complete abstract of the voluminous and most useful polemic that has raged for so long in "The Times" over the principles and behaviour of the modern British workman. All that we can hope to do is to pick out from time to time special points of the dispute in which "Journal" readers may be supposed to be particularly interested, whether in respect of the subject-matter, or out of regard for the personality of the controversialists. The whole order of gas engineers, among whom his renown is spread, will have noted without any considerable surprise that Mr. Livesey stands well above the crowd of witnesses whose testimony has helped to elucidate the facts, and that his name has become universally recognized as the centre of crystallization of the whole mass of ideas and endeavours which involve the combination of the joint-stock system with employees' profit-sharing. Public controversy shares with poverty the effect of making men acquainted with "strange bedfellows." Who would have thought that the course of newspaper correspondence would have taken the turn of placing Mr. Livesey face to face with Mr. W. Bramwell Booth, of the Salvation Army? Yet so it is; and those who will get a copy of yesterday's "Times" will read in it, not without some feeling of amusement, that to the mind of Mr. Booth, Mr. Livesey stands for Materialism as the alternative to the rule of pure Righteousness.

A wise man has somewhere written that the smallest trifles of our everyday experience, like the most ordinary rules of human conduct accepted without a second thought, will lead anyone who takes the trouble to investigate their origin and tendency, straight to the most tremendous issues

on the brink of Infinity. So here, Mr. Booth accuses Mr. Livesey of setting aside the appeal to the moral sense, and substituting therefor a direct incentive of self-interest. He objects to this that "what is wanted is a great reform in "conduct, and reforms in conduct are seldom secured by "appeals to self-interest." According to this dictum, the whole section of that religious philosophy which Mr. Booth professes, which has to do with rewards and punishments, either in this world or another conjectural one to come, must be swept away! This reflection shows how easy it is to raise these tremendous issues without intending it. As we are able to understand him, Mr. Livesey does not touch such questions at all. He merely restores to an employee who by the very nature of modern industrial conditions cannot otherwise have a hope of working "for himself," as the phrase has it, that possibility of becoming his own master without leaving his employment, which the grip of the wages system had destroyed; and the merit of his invention consists in the fact that he bends to this use the very impersonal machinery of joint-stock trading which has been accused of destroying the sense of individual responsibility in its employees. He has brought into the soulless corporation the piety of the fabled pelican, which Mr. Booth would recognize as having an emblematical significance. Further reflection on these lines would carry us farther than we are permitted to go here; but our thoughtful readers can follow the clue as far as they choose.

The King's Speech.

Apart from its references to the terribly long-drawn-out struggle in South Africa, and the relations of this country to others, the Speech delivered from the Throne last Thursday was one of the shortest on record. The promises it contained in regard to domestic legislation were remarkably few—a matter not to be regretted if the change signifies that the Ministry have thought it more dignified to only promise what they mean to perform, than to give a long list of proposals one-half of which cannot in the nature of things be carried into effect. Apart from the London Water Bill (dealt with elsewhere), only two measures referred to in the Speech can be said to concern readers of the "Journal" as such—namely, that for amending the Patent Law, and that for improving the Law of Valuation. Both of these are highly important branches of legislation in which reforms are much needed, and both fall outside the region of party politics. The second of these two facts gives more promise of the measures brought forward resulting in additions to the Statute Book than does the first—a pity, perhaps, but the truth. The Estimates for the year, we are told, have been framed as economically as a due regard to efficiency renders possible in the special circumstances of the present exigency. This delicately-worded sentence spells increased taxation; and at that those engaged in the gas industry will certainly not, "in the special circumstances," be found repining. We will only express the hope that, since increased taxation is again a necessity, the difficulty will not be considered to be satisfactorily met by fresh imposts upon the income-tax payer. Some nearer approximation of financial responsibility to political power is needed than is at present to be found, either in municipal or in national affairs.

The Toll of Ignorance.

On Christmas Day, a deplorable accident happened on the works of the Chloride Electric Storage Syndicate, Limited, situated at Clifton Junction, Salford, which resulted in the death of three men from carbon monoxide poisoning. When the earliest news of the occurrence was circulated in the newspapers, with the bald statement that the men were killed through entering a "gasholder," it looked as if the incident was one to blacken the year's record of gas manufacturing casualties; but it quickly transpired that though it was water gas that killed the men, the nature of the operations in which the sufferers were employed had nothing to do with ordinary gas making. It was a sad affair—the more so as it was shown that two of the men lost their lives in an heroic, but ignorant, attempt to save the first man who had entered the holder. It is not with the smallest desire to reflect on the conduct of the men themselves, or on the management of the works, that we mention the matter here, but solely with the object of drawing attention to the remarkable style in which what an outsider would deem to be dangerous and responsible work is often confided, in English manufacturing industries, to absolutely ignorant men. Here was a case of a carbonic oxide gasholder, which had to be cleared away during the slack time about Christmas, and replaced with a new one. The foreman in charge of the working gang did not know that the gas was dangerous. Consequently, he ordered one of his men to get inside and disconnect the pipes, which were troublesome to remove from the outside. What followed may be divined.

And all this goes on in a community talked to about the necessity of technical education until it is sick of the term! We have members of municipal committees dilating upon the desirability of bricklayers knowing something about the chemical composition of the bricks and mortar they handle. That is the nonsensical part of the story of British technical education. Here we have a case of a person in authority in a chemical works, not acquainted with the simplest facts concerning the nature of his employment which would enable him to keep himself and others out of danger. A railway company who should put a blind man to drive an express locomotive would hardly escape condemnation in the event of the inevitable railway "accident." Yet the ignorant, rough foreman who is unaware that carbon monoxide kills if breathed, is the type of the "practical man" beloved of too many British employers, and is to the full as dangerous as a blind engine driver would be.

How is this kind of trouble to be prevented for the future? That is one of the problems for technical educationists, and also for factory owners. It is useless to start technical classes if the right sort of pupils will not attend them; and it is vanity to think that the pupils will attend unless some real inducement is offered to them for doing so. It is the employers who must provide the inducement, by allowing it to be known that ignorant persons, whatever their other recommendations, will not be regarded as eligible for posts of trust and authority. The great majority of the people are, and will in all probability remain, ignorant; while there will always be a minority of pedants whose bookish attainments possess no practical value. Between these extremes lies the field which the elementary teacher, the technical instructor, and the employer must cultivate, in any country which designs to remain at the head of the procession of civilization.

The Lighting of Drapers' Shop Windows.

It was with much gratification that we recently read a brief extract from a journal of the drapery trade, on the important subject of window lighting. This is a problem which has many sides, and touches the public at several points. We were the more pleased with this little article inasmuch as it supported, apparently unconsciously, the main propositions relating to economical and effective shop-window lighting which have from time to time been laid down in the "Journal." It was admitted that the best on all accounts, and certainly the most pleasing way, of lighting a show window of fancy goods is from above, and inside. The lights, and plenty of them, should be fixed in the upper part of the shop window, well above the line of sight of passers-by, and the light reflected downwards among the goods. Obviously, incandescent gas-burners, as thick as they will go, afford the cheapest means of lighting in this admirable and most attractive fashion—incandescent electric lamps being dull by comparison, unless they are driven to a degree of brightness neither common nor beneficial to the lamps themselves.

As regards both the outside and inside lighting of a shop, it is recommended that glare should be avoided; while diffused brilliancy is to be sought. It is shrewdly remarked that blinding arc lights drive away more people with money to spend than they attract; for exposure to this ruthless light is not liked by anybody. On the whole, if properly looked after, this branch of business is not at all likely to fail the gas companies just yet. But it must be properly done, not left to chance and circumstances. If "the trade" will see to it properly, well and good. Neither gas companies nor gas-supplying municipalities wish to interfere with "the trade" in the cultivation of its little "potato-patches." But if, as usually happens, "the trade" remains serenely indifferent to its opportunities of increasing business, and is in ignorance besides of the best way of utilizing gas upon modern principles for shop or any other interior lighting, then the gas interest, company or municipal, must take it in hand. One change, at least, has been wrought by the incursion of municipal electric lighting into the common realm of trade—

the old-fashioned reluctance of gas companies to canvassing, as being beneath their dignity, has had to yield before the insistence of municipal touting for custom; for the local authorities engaging in electric lighting canvass persistently and insidiously. They also get hand-in-glove with so-called "free wiring" companies, who beg for custom in the most barefaced style. Clearly, if gas companies persist in their old aloofness, and only greet the wistful customer with deposits to make, papers to sign, and all the other obsolete precautions against a trifle of bad debt, then they will lose their business; and "serve them right" will be the popular verdict. It is many years now since we counselled all gas companies to look up fresh custom by the employment of canvassers; but it was like crying in the wilderness then.

An Impecunious Corporation.

A Corporation of the United Kingdom and Ireland which is unable to pay its gas bill is a sufficiently rare bird to be noticed. If one were to follow up this description of the rarity by the usual operation in such cases, of promptly killing the stranger in order to make a museum specimen of it, the loss might not be great. Still, promptings of humanity are now heard in the land in regard to these rarities, and even an impecunious Municipality has a right to live out its natural life which should be respected. The example here in question is the City of Limerick, which several years ago passed into the tender care of a "Labour" Council. Perhaps the influential leaders of local politics included some returned exiles of Erin who had been aldermen on the "other side," and were naturally incensed at the backwardness of their untravelled compatriots in the science of town administration. However this may have been, Limerick became blessed with Aldermen and with a Mayor who is reported to have made on his elevation to office a public declaration of his adherence to the great motto "the spoils to the con-"querors." This may have been only a figure of speech; but the plain facts of the Limerick financial situation are that, notwithstanding a heavy addition to the rates which satisfied the old Corporation, the present Corporation owe, and cannot pay, for want of money, a gas bill of £1100. The circumstance of the gas undertaking being municipal property adds to the piquancy of the situation. It is also reported that the Poor Law Guardians have threatened the Corporation with a writ for outstanding amounts. The Corporation, meanwhile, would stand high in the estimation of a convinced Progressive whose one idea is of the nobleness of the lavish outlay of public money in the direct employment of labour. Whereas the expenditure of the old Council for "improvement" purposes amounted to £47,790 for three years, the present Council have spent £58,788 on the same account, without having anything to show for it. "They "have spent £10,988 over and above what the old Corpora-"tion laid out in their time; they cannot pay their gas bill "for the current term; and as to labour, the working men "in the city can point to the fact that, beyond getting em-"ployment for their relations, their history is a blank." It is not a pretty story.

Waste Power of the Civilized World.

Some remarkable figures have recently been published relating to the quantity of motive power which is going to waste in the world. At an epoch when it is beginning to be thought likely that the coal resources of the United Kingdom should be husbanded, it is really almost comforting to learn from Mr. Bryan Donkin that there would be little need to burn coal or coke for steam raising, if only the wasted gas of blast-furnaces were turned to right account in gas-engines. There seems to be about 6½ million horse power going to waste from all the blast-furnaces of the world, which is not creditable to the mechanical engineers of the period, if the subject is looked at from one standpoint. But it is not alone blast-furnace gas power that is squandered in this heedless way. A painstaking German inquirer has been looking up the possibilities of water power in Europe, and he reports something like 7 or 8 million horse power as running to the sea for want of utilization. In both cases, it is admitted that the difficulty does not lie so much with the appropriation of the power thus going to waste, as with its profitable application. It is rarely difficult, although it is usually very expensive, to develop natural water powers by means of works. The same may be said of making wheels go round by the agency of the gases of blast-furnaces, once thrown into the air. The question is still: What to do with the power when caught? The most obvious answer is: Use it in some electro-metallurgical or electro-chemical industry. Unhappily, to mention any such applications to many a hard-working electrician and engineer is but to cause him to blaspheme; for there has been much trouble of late in this class of business. Besides, what the ordinary economist would like to hear about is that these waste powers, if utilized, would take the place of steam power generated by burning fuel. The disappointing thing is that they do nothing of the kind. It does not appear, on the face of it, that there would be much coal saved to the world if all the blast-furnace and water powers in the universe were put into harness to-morrow.

The Gaslight and Coke Company's Dividend.

We learn from Mr. J. W. Field, the Secretary and General Manager of the Gaslight and Coke Company, that the accounts for the past half year show that, subject to audit, the balance to the credit of the net revenue account will enable the Directors to recommend the payment of a dividend at the statutory rate of £4 8s. per cent. per annum, carrying forward a balance of £64,834 12s. 5d. to the next account. In July last year the balance was £97,993; in January, £221,570; and in July, 1900, £296,755. Compared with a twelvemonth ago, the balance has dropped to the extent of £156,736; and with July, 1900, £231,921.

Bradford's Tardy Act of Justice.

We heartily congratulate the Bradford City Council on the act of justice they last week performed to the gas consumers of the city, in resolving to discontinue the present system by which the Gas Committee, rather than the general district rate, have to defray the cost of public lighting. It is very hard to find a word of defence for a method of taxation by which a portion only of the community pays for benefits enjoyed by all—unless, indeed, it is the very poorest people who get off scot free. But this cannot be urged with reference to the case in point. It is rather the other way about; for while the prepayment meter system has doubtless induced the working classes to become gas consumers in large numbers, many of those who do not use gas—the ones who prefer electric lighting, for instance—could well afford to pay their share of the cost of public lighting. This we are glad to see they will have to do after the close of the present financial year; and then the much wished-for reduction in price to those who support the undertaking by consuming gas in their homes and business premises will be brought well within sight. An idea of the change that will be wrought in the finances of the department by the charging of the public lighting on the district rate, will be gathered when it is stated that, in the financial year ending March 31 last, there was a loss on the working of the undertaking of £5825, which would have been turned into a profit of £27,909 if the system that is now to be adopted had been in operation at the time; while the Chairman of the Gas Committee states that this year there has been a loss of no less than £10,000—the public lighting having cost the department £30,000.

Electrically Generated Gas.

Light is being gradually let into the mystery which at one time befogged the question of street explosions; and it looks now as if gas may in the old days have suffered in reputation for evil-doings of which it was altogether innocent. If at one time there was an electric-box lid suddenly uplifted, or if there was an upheaval of a portion of roadway containing an electric light conduit, people always immediately jumped to the conclusion that gas had, by some occult means, obtained entrance to the electric conduit and box, and that the electricity had taken summary and forcible means of ejecting it. Since those days, clear proof has been obtained that some electrical systems are their own gas generators, and that they are perfectly competent to supply, without any exterior aid, all that is necessary to create beautiful earth disturbances.

And Street Explosions.

We have illustrations of this in the recent Newgate Street and Ludgate Hill explosions—the one on the Charing

Cross and Strand Company's system, and the other on that of the City of London Company. These are competing enterprises in the same area; and the affection between the two is not likely to become greater if there are many such occurrences as those under notice. But at the Board of Trade inquiry into these disturbances, Mr. W. H. Patchett, the Chief Engineer of the Charing Cross Company, gave it as his honest opinion that the Newgate Street explosion was due to inflammable vapour given off by the bitumen protection of the cables. This bitumen gas seems to be a very uncomfortable sort of enemy. On the day of the first explosion, a man was overcome in trying to get into the Company's Giltspur Street box. During the time the men were there, a consumer close upon Newgate Street found smoke entering his cellar; and while the Company's men were making a disconnection outside the premises, an explosion followed the lowering of a lamp into the Newgate Street box. When the box was cleared, a man went down; and, on striking a match, the bitumen gas again fired, and another explosion occurred. Fortunately, no one was seriously injured by the explosions; but it is a wonder someone was not. While the damage was being repaired on the following Monday, we took an opportunity of visiting the scenes of the explosions in Newgate Street and Ludgate Hill: and at both there was ample evidence of their violence. Damaged electrical work and charred wood were lying about; and at the latter place were metallic covers punctured and dented through the force of the explosion, and one or two were observed somewhat freely pitted. Was this through rust?

Profligate Electric Currents.

The Chief Engineer of the City of London Company (Mr. W. Bailey) attributes the origin of the Ludgate Hill explosion to the fact that the metallic shields in his Company's system had to take a heavy leakage current through the fault in the competing Company's mains in Newgate Street. If Mr. Bailey objects to a relative imposing upon him in this way, how much more are the gas and water companies justified in remonstrating with a stranger on an unwarranted trespass? Perhaps Mr. Bailey will now have a little more sympathy than he may have formerly possessed for the position which has been taken up by gas and water companies in connection with wandering electrical currents. Truly, we live and learn.

A Serious Case at Gravesend.

It is impossible to regard in any other than a serious light the complaint contained in a letter addressed, on the 6th ult., by the Gravesend Gas Company to the Paving, Lighting, and Works Committee, and which, as reported elsewhere, was considered by the Town Council at their last meeting. The Company stated that, on testing thirty-two governors taken from the public lamps, it had been found that more than 30 per cent. of them had been deliberately tampered with; the regulators having been fastened down with wire in such a way as to largely increase the quantity of gas passed. Whether the Committee considered that this was too weighty a question for them to decide, or whether they regarded the action complained of as honest and straightforward, it is impossible to say. But, at any rate, in presenting the letter to the Council, they made no recommendation in regard to it. The subject, however, was not to be got rid of in this easy fashion; for after a long discussion and an explanation from the person responsible—at least in part—for what had been done (the Gas Inspector), the Council very properly referred the Company's letter back to the Committee for further consideration.

The Defence.

As the matter has thus not been finally disposed of, it would be unfair for us at the present time to pass judgment upon it; but it may be pointed out that the Inspector disclaims responsibility for the fixing of some of the wires, which he believes was done by a man who has since been dismissed for another reason. The Company assert that a "gross fraud" has been perpetrated upon them; while the Gas Inspector contends that he acted quite innocently. The governors were not passing the quantity of gas they should do; and to remedy this, he applied a small piece of wire, which had the desired effect. Under their agreement with the Company, the Corporation are bound to supply regulators to the lamps; but assuredly the use of these appliances surreptitiously weighted with S hooks was never contemplated. For about twelve months, the governors have been weighted in this way; and the fact has only now been discovered by the second party to the contract. Whatever the result to the Company may have been, it is easy to see that they might have suffered a very grave injustice. The case should serve as a warning to zealous officials occupying a similar position to the Gas Inspector at Gravesend, who may be tempted to improve the public lighting in this manner; and we are sure that its lesson will not be lost upon gas companies.

Counting the Cost at Warrington.

In view of the fact that at Warrington both the gas and electric lighting undertakings are in the hands of the Municipality, special interest attaches to a report on the cost of street lighting by the two systems which has been presented by the Borough Surveyor to the Street Improvement and Lighting Committee. The gist of the report (which is reproduced in another column) is that while arc lighting costs £572 a mile per annum, the total outlay on incandescent gas-lamps is £180 a mile. This is reckoning 26 of the former and 28 of the latter over the distance specified; the arc lights being turned out at midnight and the glow lamps put on, and the incandescent lights being lowered at the same hour. On the other hand, it must be pointed out that the total candle power per mile of the 26 arc lights is 52,000, while that of the incandescent gas-lamps is 8400; the cost per candle power per annum of the former being 2·64d., and of the latter 5·14d. That the lower cost of the electric light per candle power per annum is altogether illusory, is proved by the fact that, while those persons whose premises are opposite the arc lamps get almost enough light to illuminate the inside as well as the outside of their shops, those situated between the lamps (who, of course, pay the same rates) have very little light. Then, again, a good deal of the difference between the two total candle powers is removed, when we consider that the electric lights are placed high up in the air, while the gas-lamps are only about 9 feet from the ground. One speaker at the meeting of the Council at which the report was considered went so far as to say that the electric lights were too far apart, and that if they erected the number really required, the town would be put to some ten times the cost it is now. Under these circumstances, it is not to be wondered at that the Council approved the Committee's determination to extend the use of incandescent gas-lamps (at one-third the cost), rather than of electric arc lights. Of course, all this is not new; but it is nevertheless a welcome addition to the mass of evidence on the same subject already in existence in one form and another.

Redeemable and Irredeemable Stock.

The Swansea Corporation have given notice of their intention to promote a Bill to enable them to convert their irredeemable stock into a redeemable stock without the consent of the owners. According to the official notice sent out by the Town Clerk, the only consideration offered for this sacrifice is ½ per cent. "upon the nominal amount of "irredeemable stock" held. Attention has been called to the fact, in the Money Article of "The Times," by Mr. Ernest L. Walford, of the Stock Exchange. He characterizes the proposed conversion as "confiscation pure and "simple;" and he says that if Parliament sanctions it, no security will be safe. Why, he asks, should not certain railway companies be permitted to pay off their perpetual 5 or 6 per cent. debenture stock?

The estate of the late Sir Wilford Brett, K.C.M.G. (for many years Chairman of the Buenos Ayres Gas Company), who died on the 30th of October last, as recorded in our columns at the time, has been valued at £11,895 gross, with net personalty *nil*.

In a portion of the earlier copies of last week's "JOURNAL," one of the illustrations of the improved Drory tar overflow for hydraulic mains on p. 91 was accidentally put upside down by the printers. Corrected copies of the sheet will be sent to any subscriber forwarding a postcard.

WATER AFFAIRS.

Government and the London Water Question.

THE problem which has for so many years baffled those ardent reformers who have attempted to effect a radical change in the conditions of the Metropolitan Water Supply, has advanced one stage nearer solution. In the Speech delivered by His Majesty the King in opening his second Parliament last Thursday, the Government announced that a measure would be introduced for "amending the adminis-"tration of the water supply in the area at present controlled "by the London Water Companies." Within a few hours of that authoritative pronouncement, the President of the Local Government Board (Mr. Long) notified to the House of Commons that on an early day he would introduce a Bill for "establishing a Water Board to manage the supply of "water within London and certain adjoining districts," and for transferring to the Board the undertakings of the existing Companies. Thus he has fulfilled the promise made, when he asked the House to reject the Purchase Bill of the London County Council early in the past session, on the ground that it did not carry out the recommendations of the last Royal Commission, that, with the approval of his colleagues, he would himself introduce a Bill which would not only do this, but also deal satisfactorily with a question which had troubled London, the outside areas, and the House itself, far too long. Attempts were made at the time, in certain quarters, to cast doubt upon Mr. Long's sincerity, and to minimize the value of his promise because it had been made conditionally upon securing the approval of his colleagues. We never entertained doubt upon the matter; and now all ground for any has been removed.

The only points on which uncertainty for the present exists are as to whether the Bill will really carry out the intentions of the Royal Commission in respect of the constitution of a Water Board such as the one indicated in the "London Gazette" notice, and whether the terms upon which the undertakings of the several Companies are to be transferred will, as contemplated by the Commissioners, be fair and reasonable—or, in the words of their report, "on "the terms usual in cases of compulsory purchase." On these points, the most divergent views exist, as manifested by recent public utterances. As to how far there is any justification for them, it is impossible to say until the Bill has been introduced. Mr. Long promised a measure which would be just alike to the parties to be bought out and to the purchasers. It is to be hoped that his promise may be fulfilled to the letter. As far as the Water Companies are concerned, justice is all they ask at the hands of those who are to oust them from the possession of undertakings which they have endeavoured year after year, in the face of constant opposition, to make thoroughly adequate to the needs of the community, and take over the management of an important public service which every investigation has shown to have been efficiently conducted, so far as this result could be achieved by means within the control of those who were responsible for its maintenance.

Last Year's Rainfall.

RAINFALL and water supply are so closely connected—abundance or absence of the former meaning, in many cases, plenitude or deficiency of the latter—that no excuse is needed for referring here to some interesting tabulated statistics in regard to the rainfall of last year, compared with the average of the ten years, 1890-99, recently sent to "The Times" by Mr. H. Sowerby Wallis and Dr. H. R. Mill, who, as some of our readers are aware, are continuing the useful work initiated in 1860 by the late Mr. G. J. Symons, and carried on by him for so many years with ever-increasing earnestness. It may be remarked, in passing, that Dr. Mill contributed one of the most valuable papers presented at the Sanitary Institute Congress on Water Supplies and River Pollution in October last. It was the custom for Mr. Symons, at the commencement of each year, to give the public, through the medium of the leading journal, some particulars in regard to the rainfall for the preceding twelve months; and the practice is being followed by his successors. Though there was a considerable period of drought, 1901 was not a very eventful year in respect of rainfall; the tabulated returns showing a rather irregular distribution. In the centre of England there was a slight excess of rain; while in the south-east and north-west there was a deficiency. In other words, to the north-west and south-east of a belt of average rainfall stretching from the Severn to the River Humber, the year was distinctly a dry one. In Manchester, the deficiency was about 4 inches. In Scotland, with the exception of Ayrshire, the returns from every one of the many observation stations show a considerable falling off—being as much as 14 inches at Strathconon. In Ireland, the majority of the stations recorded rather more than the average; but in the extreme south-west, at Darrynane, the fall was 14·43 inches less. The preceding particulars may be supplemented by others taken from the latest report by Sir William Crookes and Professor Dewar on the London Water Supply. A table giving the Oxford rainfall month by month last year shows that the total was 22·16 inches, compared with 25·29 inches the mean of 35 years.

Underground Water Rights.

In the "JOURNAL" a fortnight ago, reference was made to an interesting decision given by the Court of Final Jurisdiction of the State of New York in respect of claims by certain market gardeners for compensation for alleged deprivation of underground water by pumping operations. It was shown that the water was taken at too great a depth to seriously affect the claimants; and the Judge reduced the "damages" very considerably. It appears that one of the Lower Courts of the United States has adopted the following as a reasonable interpretation of the law as to underground water in cases similar to those above referred to: If it can be proved that the natural ground water-level is 7 feet below the surface of a given tract of land, and that celery and watercress cannot utilize water in the soil at more than 3 feet below the surface, the failure of crops must be due to deficient rainfall, the exhaustion of the soil, or some other surface condition, and therefore pumping operations have nothing whatever to do with it.

A Water-Pipe Claimed to be a Sewer.

We doubt if even that section of the London County Council which is most antagonistic to the Water Companies and all their works would venture seriously to term "sewers" the pipes by which water is supplied to the Metropolis. It has been reserved for an Otley Solicitor to contend that "a line of pipes conveying water" is covered by the word "sewer." It seems that the laying of water-pipes is not one of the employments mentioned in the Workmen's Compensation Act; and in order to bring the case of his client (who was injured while engaged in this work) within the Act, for the purpose of securing compensation, this gentleman somewhat ingeniously contended that such operations were covered by the word "sewer," referred to in section 7. In support of this plea, he pointed out that various dictionaries gave the meaning of the word sewer as "a passage under ground for water." But if this is so, we can only remark that the definition is a very incomplete one. The Otley County Court Judge, who tried the case, quickly brought this argument to the ground, by merely remarking that he could only give an interpretation to the word such as it was ordinarily understood to bear, and no one hearing sewers mentioned would ever think that water-pipes were meant. He therefore gave judgment for the defendant. This was certainly a commonsense view to take; and the only strange thing is that it should have appeared necessary to appeal to a Judge to decide such a question. However, justice has been done, and water-pipes have been saved the indignity of being judicially pronounced sewers "within the meaning of the Act."

The Sub-Committee of the Carlisle Corporation, to whom was referred the duty of selecting a short list of candidates for the vacant gas managership, have named five out of the twenty-nine applicants; and these will appear this week before the Gas Committee for final choice.

Sir John Aird, Bart., M.P., has been the recipient of a beautiful album, presented to him by the Italian workmen at the reservoir works at Assouan. Each leaf contains a view of the works; and the signatures of the subscribers, who number nearly 2000, are added. The presentation took place at the general office of the reservoir works, when an address was read by Mr. Alessandrini. In reply, Sir John Aird stated that, in going through some figures that day, he had noticed that no less than £270,000 had been paid to Italian workmen, and it had been paid with pleasure in return for their earnest work.

ESSAYS AND REVIEWS.

THE TREND OF GAS INVENTION.

THERE has been a disposition on the part of a good many Englishmen during the last few years, after paying a visit abroad, to return home and glorify the foreigner's supposed supremacy in the useful or mechanical and fine arts, at the same time belittling the work of their own countrymen. The reason for this may be found in the fact that on quitting home, the impressionable traveller leaves familiar work, surroundings, and people, and goes to a country where everything is new, or comparatively so, to him. His imagination and interest are sharpened and excited in the unfamiliar surroundings and among different people. Small things and doings which would perhaps pass almost unnoticed in the ordinary daily walks of life are in consequence magnified, and larger matters and work are impressed upon the mind as magnificent and almost approaching the wonderful. But after the traveller has returned home, if he will allow (before he begins to extol the works of those beyond our shores) the daily routine of his usual life to smooth down the nimbleness of mind and impression, which are both mutable in sudden freedom and unusual opportunity for sight-seeing and inquiry, and will approach the consideration of the question of comparison in a temperate and serious spirit, he will find that it is only in direction and not in the whole orb of our manufactures and arts that the foreigner has attained a degree of supremacy. In other directions, this country will be found in the van.

Taking the gas industry, for example, and particularly its manufacturing side, we find that, while two of the new developments in this country have come to us from abroad—carburetted water gas and inclined retorts—we have left Continental practice far behind in the latter regard, and are far before the Continent in respect of the former, though not ahead of our American friends. But here again our inclined-retort installations have no comparison on the other side of the Atlantic. Then in the mechanical methods of dealing with our raw material and coke, we are well in advance of other countries; while they, with their superior, or rather more general, chemical knowledge may take the lead over us in invention in connection with the systems of dealing with and utilizing other residuals. In ordinary incandescent gas lighting, they have had precedence; and they have shown us the way. But we have partially paid the debt with systems of high-power incandescent gas lighting. Therefore, it is only in direction, and not in the general development, that this or that country has the right to any claim for supremacy. As in the gas industry, so in other industries. In short, it is only in those industries that are native to a country in which supremacy is an absolute possession. But in industries common to other countries, the indicator of change is constantly rising and falling in favour of one or the other.

But standing where we are to-day, and looking at the landscape of the gas industry, we have to confess to an obligation to others abroad for a good deal of conception, but they to us for evolving development. We have, however, arrived at a stage at which there seems to be a pause. Development has reached a practical level in certain methods; and their adoption is going forward apace. But on the engineering or manufacturing side of the industry, conception and new invention are at the present time confined and limited; and few heads appear to be troubling themselves in any of the several lines which the operations of our gas-works present. The "JOURNAL" "Register of Patents" is our index and authority. There gas manufacturing methods and improvement in apparatus have lately given place to articles of utility in connection with the employment of the product of the works. The *personnel* of gas invention has to a large extent changed; and with that change the objects of invention. In number, gas patents are as great; in quality and purpose, there has been a depreciation. Without making a definite count, too, of previous years, the number of alien gas patents taken out in this country appears to be on the increase; but their number is merely enlarged by the sameness of the route taken by many of the inventive minds of other countries. We will presently show that this is so. Skimming through the bulk of the recent foreign patents raises a doubt on the point of any considerable ultimate value. If the relative value of the natives and the exotics could be determined, we venture to hold the opinion that the former would not by any means be found second in order, although, at the same time, there have been but few of late that have really been noteworthy.

We have been led into an examination of our last year's "Register of Patents" by a conversational remark of an old gas engineering friend, casually met on the closing night of the Crystal Palace Gas Exhibition. He referred to the Exhibition as only illustrating the fringe of the gas industry, and spoke of the title of "International Gas Exhibition" as a misnomer, and then of the interest which a real "international" gas exhibition would occasion. This brought him to an observation or two on the virility in invention of our gas friends abroad; and as witness of this, he mentioned the "Register of Patents" in the "JOURNAL." Curiosity was aroused, and an instructive examination of last year's volumes has been made; and we fancy that readers will be interested in the figures obtained. They refer to the specifications of patents actually published during the year, and not to the applications made. The investigation seems to show that the inventive faculty in the British gas engineering profession has been having a long rest; such inventions as there have lately been in works plant having emanated almost entirely from the manufacturers. It is also shown—and this is some satisfaction—that Britishers have held a lead over the foreigner in such gas-works plant as has been invented, notably in conveyors, retort-house machinery, and washing and purifying plant. In meters, too, this country stands predominant. But foreign inventors are in the ascendancy in regard to incandescent burners, mantles, and lighting and extinguishing devices; and in these divisions, we find a widespread inventive inclination abroad. The figures, in fact, disclose that about one-half of the specifications we noticed during the year dealt in one way or another with gas lighting, and that the ratio of foreign patents to British in this particular line is two to one. It is doubtless the frequent appearance of these which gives the impression of superiority abroad of inventive power; and, besides, it must not be forgotten that we are opposed singly to several countries.

Altogether in the twelvemonth we dealt with 259 specifications of gas patents, of which residents in Great Britain contributed 126, and inventors abroad 133; so that the latter had a balance in their favour of 7. But seeing that the foreign patents associated with lighting about doubled ours (being 75 as compared with 38), it must be conceded that the British patents at all events showed a greater variety—those other than lighting amounting in our case to 88, as against 58 for our friends abroad. Their precedence in the number of lighting inventions is no doubt due to their freedom in the matter of incandescent gas lighting, and to our restraint during the Welsbach mantle monopoly.

It will be interesting to investigate the relative figures with a little more minuteness in connection with their subjects, as they show distinctly the trend of invention during the twelve months to which the specifications refer, and affords some idea of the course of improvement to-day. Taking the manufacturing plant first, we find a complete absence of invention in connection with inclined retorts. Stay, there was one foreign idea for stoppers. There was but one British patent connected with retort-settings, and one for something novel in the way of a tubular boiler for gas-retort furnaces. Gas-manufacturing systems, which were swollen in number by a certain irrepressible American—to wit, Mr. P. Naef—are represented by nine patents from abroad and four from this country. Combining gas producers and generators large and small, we have nine British patents and five from foreign sources; and in this relation, as carburettors are able to raise a poor gas to a position of greater usefulness, it may be mentioned that there were four home carburetting proposals and one from abroad. An outside source also supplies a plan for mixing oxygen with lighting or heating gas. Foreigners lead the way with five suggestions for improving water-gas manufacture; while this country takes a back seat with one. From abroad, too, came a plan for combining the making of coal and water gas. But we soon excel again with eight inventions in connection with conveyors and other apparatus for dealing with coke. There were no imports in this line. In retort-house machinery, with four patents, we double the outsiders. An Englishman presents us with a coal screening and breaking apparatus, and another with an automatic relief apparatus for hydraulic mains. Lumping together the inventions referring to condensing, purifying, and washing and scrubbing gas (including producer gas), we can claim seven as against three; but we have a foreign introduction to a method of cleansing gas-purifying apparatus, against which we have a set-off in a proposal for revivifying gas lime. Speaking of purification, we may mention one notice of a foreign suggestion for purifying acetylene. To other countries we must give credit for the only three schemes for improving gasholders and their guiding.

This presents us with a very poor record of actual patentable improvement in coal-gas manufacturing plant over a whole year; and in matters intermediary between the works and the gas consumer, we find a corresponding barrenness, excepting in one regard. Take the testing of gas first, all that can be discovered is one foreign patent claiming an improvement in photometrical arrangements, which we balance by a calorimeter and gas water-heater. A little more attention has been given to the bye-products of gas manufacture; but there is little that indicates any pronounced enthusiasm even in this regard. Two patentees—one at home and one abroad—have been turning their attention to the treatment of ammoniacal liquor and the making of sulphate of ammonia; two Englishmen advance methods for the treatment of sulphuretted hydrogen; one invention connected with the manufacture of cyanide compounds puts in an appearance from abroad; while two gentlemen outside this country also introduce arrangements for purifying anthracene. Another foreigner takes credit for a plan for extracting naphthalene from gas. Thus, on the chemical side of gas invention, foreign patentees have a little advantage, and are likely to continue to have until our ordinary educational curriculum embraces chemistry as a general study. Lying between the supplier and the consumer is the meter; and there we show one of the directions in development along which this country has left other countries far in the rear. This advanced condition no doubt accounts for our pre-eminence in the matter of improvement in prepayment meters. A successful application of any system, where there is not a repressive monopoly covering the entire country, always produces seekers after greater efficiency

or simplification of methods. So we have to our credit for the year twelve patents in coin meters, compared with one from elsewhere; and in ordinary meters we boast three improvements, while other countries have not produced anything in this respect for which they have asked protection here. Before we come to inventions in the lighting and heating classes, there are a few miscellaneous ones which may conveniently be attached to the foregoing group. A device for locking gas-taps is an English production, and so is a pressure-recorder. But an invention has come from abroad for testing gas-pipes; a second for preventing the fluctuation of gas-flames supplied from the same source as gas-engines; and a third for indicating the presence of coal and other gas in the atmosphere. Honours are equally divided in respect of gas-engines—the number of patents from home sources being five, and the same for abroad.

We have left inventions relating to the utilization of gas to the end; and this is a most interesting class—the foreign contributions so greatly predominating. In incandescent mantles, lamps, and accessories (not including burners), we can only oppose eleven patents to the foreign inventors' twenty-four. Then in burners (mostly for incandescent use) and burner regulators, we can only set sixteen against thirty. Speaking of regulators, we may insert here a reference to four suggestions for governing the supply of gas—two native and two foreign. Contrivances for turning gas on and off at predetermined times, for lighting and extinguishing gas, and automatic lighters, total to thirty, twenty of which were devised out of this country. We have already expressed an opinion as to the reason for the more prolific invention in incandescent lighting abroad. Arrangements for mixing gases and air are represented by one British patent and two foreign. Gas and air compressing systems had three home contributors, and one from abroad; while we balance this latter with an English high-pressure accumulator. Gas-pendants have only one representative, and that English; but we are indebted to a foreign source for a pendant suspension fitting. New proposals connected with street lanterns received three additions from home; and the variety of torches for lighting them has been extended by five of English production. But a gentleman on the Continent has sent over a suggestion for raising and lowering lanterns, by which, we suppose, he facilitates attention to highly-placed lamps. Lighthouse illumination has, it is to be hoped, been rendered even more efficient than formerly by one English invention. This concludes the collection of new lighting appliances; and we come to the last item on our list, which shows that eight patentees—equally divided between home and abroad—have endeavoured to enhance the value of gas stoves and fires.

This ends our examination of new invention as revealed by the specifications published last year. We cannot say that, in substance, recent invention has been on an altogether uniformly satisfactory scale. In some respects, Great Britain takes the lead; while in others, our friends abroad excel. From a numerical point of view they are slightly ahead of us; but in substance, we may fairly claim the upper hand. Still, our examination has not disclosed anything strikingly remarkable, nor any notable tendency in the gas profession to the production of new ideas, to exclusive rights in which protection could be fairly asked.

GAS BILLS FOR 1902.

(*Continued from p.* 84.)

The Abercarn Urban District Gas Bill is to authorize the purchase by the Council of the undertaking of the Abercarn and Newbridge Gas and Water Company, who were incorporated by an Act of 1884. The Company have never exercised their water powers; the supply being under the control of the Council. The price of the gas undertaking is to be agreed, or ascertained by arbitration as for compulsory purchase under the Lands Clauses Acts. The limits of the Council for the supply of gas are the district and the parish of Mynyddyslwyn in the rural district of St. Mellons, all in Monmouthshire. Consumers' fittings are to be inspected. Gas of 15-candle power is to be supplied at the maximum price of 5s. per 1000 cubic feet within the district, and 6s. beyond. The Local Authority for the parish of Mynyddyslwyn are to have the right to purchase their portions of the undertaking at six months' notice. In addition to the price of the property, the Council desire to borrow £20,000 for gas-works extensions and improvement and for working capital, repayable in forty years. Renewal and reserve funds may be formed out of gas revenue. Gas consumers' contracts are not to disqualify members of the Council.

The Belfast Corporation Bill contains a few provisions relating to gas. It is proposed to place electric and gas fittings on the same basis as regards hiring out, and to empower the Corporation to make bye-laws, regulations, and conditions for the fixing of pipes and wires so as to secure the safety of the inhabitants and the prevention of fire. The sum of £10,000 is to be borrowed for the purpose of supplying fittings, to be repayable in twenty years.

The Bradford Corporation Bill contains a part to enable the Corporation to purchase the undertakings of the Clayton, Allerton, and Thornton, the Airedale (Idle), and the Eccleshill and Bolton Gas Companies respectively, upon agreed terms, which are scheduled. Any debenture stock of a Gas Company so acquired is to be redeemable by agreement. The price of gas within the limits of the city is to be made uniform, and outside the city is not to exceed this figure by more than 8d. per 1000 cubic feet. Outlying portions of the acquired undertakings are to be saleable to the Local Authorities. The additional gas capital is to be redeemed in forty years.

The Knaresborough Improvement Bill contains a part relating to gas. It defines the limits of supply as being the urban district and the parishes of Scriven and Knaresborough Outer. Power is desired to let fittings, and to specify and inspect consumers' pipes. The price of gas supplied "for illuminating purposes" is not to exceed 4s. 6d. per 1000 cubic feet. Gas of 14-candle power is to be supplied; but the section is not to apply to power gas supplied by the Council. Interest at current Bank rate is to be chargeable on consumers' deposits. Pipes may be laid for use for ancillary purposes. Proportional meters may be used for measuring power gas supplied by the Council. No additional gas loan is required. Surplus gas revenue is to be appropriated to the district fund.

The Leicester Corporation Bill contains a part relating to gas. Power is sought for the construction of additional gas-works on land scheduled. A trunk main is to connect the new works with the distributing mains of the Corporation. The sum of £500,000 is to be borrowed for gas purposes, repayable in forty years. It is proposed to provide for the payment of interest on the Corporation capital loans by the formation of an interest fund. The periods of the sinking funds may be equated in accordance with a scheme, and money may be raised by the issue of Corporation bills of not less than £500 each, not payable to bearer.

The Newport Corporation Bill contains some references to gas in connection with certain street works necessitated by tramway extensions. A bridge is to be widened and a gas-main diverted by the Corporation, it being provided that when and so soon as the diversion is completed, the main and all supports and works connected with it shall vest in the Newport (Monmouthshire) Gas Company, and no liability to repair or maintain the same shall attach to the Corporation. Agreements with the Company with respect to this work may be entered into by the Corporation, and the Company are to be empowered to apply their funds to the purposes of any such agreement.

The Omagh Urban and District Gas Bill is to provide for the transfer of the undertaking of the Omagh Gas Company to the District Council. The Company was a limited Company formed in 1856; and an Act was obtained last year under which power of purchase was reserved to the Council. The gas limits are to include the district and so much of the parishes of Drumragh and Caffagh as lie within 2½ miles radius of the centre of the gas-works. In addition to the costs of and incidental to the transfer, the Company are to be paid the taxed costs of obtaining the Act of 1901. The maximum price of gas of 15-candle power is to be 5s. per 1000 cubic feet. A reserve fund may be formed out of revenue, and surplus gas profits are to be carried to the credit of the district fund.

The Rhondda Urban District Council (Tramways, &c.) Bill contains a part relating to gas. The clauses propose to endow the Council with the usual description of modern powers and facilities for the conduct of their gas undertaking as regards the specifying and inspection of consumers' fittings and the like.

The Tipton Urban District Council Bill contains a short part of two clauses relating to gas. New gas lands are to be appropriated to the purpose of manufacture; and mains are to be laid in undedicated roads on the usual conditions. Additional gas capital to the amount of £10,000 is desired, repayable in fifty years. It is proposed to equate the periods of sinking funds.

The Whitstable Improvement Bill contains a part relating to gas, under which the Urban District Council propose to purchase the undertaking of the Whitstable Gas and Coke Company, Limited, with a share capital of £14,000 and no debenture debt. The gas limits are to be the district. The maximum price of 15-candle gas is to be 4s. per 1000 cubic feet. Consumers' fittings are to be specified and inspected. In addition to the price of the undertaking, the sum of £5000 is to be borrowed for gas-works purposes. Surplus gas profits are to be carried to the credit of the district fund.

The City of London (Streets) Bill directly affects the owners of pipes in the streets of the City. It requires three months' notice to be given by undertakers before opening any street, except in emergency cases or for connecting services. The notice is to set out in detail, with drawings, what is proposed to be done. Notice of the intention to break up a street is to be posted for fourteen days in the street, stating also where plans and sections of the proposed work can be inspected. If any other authorized undertakers desire to do any work in the same street, they must notify their intention within the fourteen days of the first posted notice. The Corporation propose to take power to prescribe the sequence in which streets may be opened, and to formulate directions as to how the work is to be executed. Temporary reinstatements of the street surface are to be attended to; and if more than one undertaker is concerned in any street work, the Corporation Engineer is to allocate the cost of reinstatement between them. Periods are proposed for the opening of streets under and after notice. No fresh breaking-up is to be permitted without the consent of the Corporation for nine months. When the Corporation contemplate doing any paving work, they may give undertakers a month's notice and also post notices for fourteen days; whereupon any

undertakers who may avail themselves of the opportunity for doing work of their own will be allowed to do so without further notice. No such remade street is to be again broken up for nine months. Penalties of £50, and £20 a day are proposed for infractions of the provisions of the Bill. Appeals from the Court of Summary Jurisdiction are to Quarter Sessions. Bye-laws made under the Act are to be on sale at not exceeding 6d. a copy.

CHANGES IN WAGES AND HOURS OF LABOUR IN 1901.

As with trade so with wages, last year witnessed a material decline from the high-water mark of 1900. In all of the five years 1896 to 1900, the net result of the changes in rates of wages reported to the Board of Trade was an increase; the last year of that period being especially remarkable for the magnitude of the rise in the wages of coal miners and metal workers. The movement was, however, reversed last year; the net effect of all the changes recorded in 1901 being a fall amounting in the aggregate to £78,500 per week, or an average of 1s. 9d. per head of the 901,820 workpeople affected. But, as showing that, apart from the coal and iron trades, business generally was not seriously on the down-grade last year, it must be noted that the decline in wages was entirely confined to the mining and metal industries.

In the coal-mining industry, 704,681 persons suffered reductions in wages averaging 1s. 7½d. per week per head in 1901, as compared with increases to practically the same number of hands in 1900 equal to 4s. 10d. per head. Were the Federated Districts (in which alone an increase was shown last year) excluded, the average fall in wages would appear much more considerable. It will be remembered that just at the time when the coal "boom" was most prominently before the public, though the most anxious time for large consumers was over—namely, in August, 1900—it was arranged that in the Federated districts wages should be increased (by 5 per cent. in January, and again in February) to 60 per cent. above the standard; and at that level the rates payable in these districts remain.

In view of the great probability of trouble arising over this question of wages in the coalfields in the not distant future, the following figures will be found interesting at the present moment, and useful for reference later on:—

Coal Miners' Wages.

District.	Percentage above standard at end of 1896.	1900.	1901.
Northumberland	3·75	53·50	31·00
Durham	15·00	65·00	40·00
Federated districts	30·00	50·00	60·00
South Staffs. and East Worcester	30·00	50·00	60·00
Somerset	15·00	37·50	47·50
South Wales and Monmouthshire	10·00	73·75	66·25
Scotland, East	—	97·50	47·50
Scotland, West	12·50	100·00	50·00

From these figures, it will be seen that, while some substantial decreases took place last year—notably in Scotland and the North of England—wages have a long way yet to fall before they get back to the point from which they started five years ago. It is during the latter stages of the return journey—not yet begun in the districts ruled by the Federation, outside Wales—that trouble is most to be looked for. The great pity is that the miners' rates of pay should ever be allowed to be so enormously increased without any reason, looking at the matter from the point of view of the amount or quality of the work done. But the principle that wages should more or less vary according to the price of coal having been once established, and the Miners' Unions allowed to acquire such wealth and power, we suppose it is almost beyond the power of the colliery owners—however desirable it may be—to effect a revolution in this respect, unless they could form a comprehensive and adhesive Union of themselves.

Next in importance to the changes in the coal-mining industry come those in the iron and steel trades, the wages in which are regulated, for the most part, by sliding-scales. In these trades, wages rose steadily for five years, until the total weekly increase, comparing 1900 with 1895, amounted to £33,420, or no less than 8s. 4d. per head of those persons affected. In 1901, however, nearly two-thirds of this increase was lost; the total decrease for the year being estimated at £20,319 per week. It is worthy of remark that these decreases, consequent upon falling trade, are accepted by the iron and steel workers in a much more philosophical spirit than are similar reductions accepted or considered by the coal miners.

In the building trades, there was a further rise of wages last year, but only about half as great as in 1900. Some 30,000 workmen received increases, while 6600 (mostly in Scotland) sustained decreases; the net increase in the average weekly wages working out to 1s. 3d. per head of those affected. In the engineering and shipbuilding trades, the balance in favour of the workmen only averaged 4¼d. per head during 1901. In miscellaneous trades, about 30,000 persons (including 9900 compositors) obtained an average increase of 1s. 4d. per head. Altogether, about 800,000 workpeople in the mining and metal trades received decreases averaging 2s. 1d. per head in their weekly wages; while about 100,000 persons engaged in other trades obtained increases averaging 1s. 2d. per head per week.

Of this total number of persons whose wages were changed (say, 900,000), only 13,676, or 1·5 per cent., were concerned in disputes causing stoppages of work—a remarkably low figure; that for 1900 being nearly 5 per cent. The changes were brought about, as regards 20 per cent. of the total, by direct negotiation between employers and men; as regards 57½ per cent., by means of Conciliation Boards, mediation, or arbitration; and as regards 21 per cent., by sliding-scales. The net result is that, of the total increase in weekly wages obtained during the five years ending 1900—namely, £440,000—the workers lost £78,500 last year; leaving the weekly wages bill of the country still £361,500 above the 1895 level. The present year will doubtless see a very considerable further reduction.

In regard to changes in hours of labour, there is very little to report; the number of persons affected by such changes being the smallest since 1895—only amounting in the total to 24,749. Practically the whole of these had their hours of labour reduced, the average being just over two hours per week. The principal changes of the year occurred in the printing and allied trades group, which accounts for more than half the number of workers affected. What with increasing wages, decreasing hours worked, and sadly diminished individual output, it is not surprising to hear that the printing trade is by no means flourishing. Failures therein have been unpleasantly numerous, as the gas undertakings supplying the trade could probably testify.

GAS UNDERTAKINGS RETURNS.

As intimated in our editorial columns last Tuesday, the returns relating to the gas undertakings of the United Kingdom for the year ending Dec. 31, 1900, in the case of the Companies, and March 25, 1901, for the Local Authorities, were issued on the previous day, pursuant to an order of the House of Commons dated the 2nd of April last. The immediately preceding returns were published on Jan. 1, 1901.

Particulars are this year furnished in regard to 693 gas undertakings, compared with 682 before—an increase of 11. The newcomers among the Companies are the Abergele, Irthlingborough, Lymington, Mablethorpe, Manningtree, Rugeley, South Elmsall, and Wath-upon-Dearne; while the additions to the Local Authorities are Gainsborough, Loughborough, Morecambe, Portland, South Molton, Torquay (which formerly appeared as St. Mary Church), Wenlock, Helensburgh, and Troon. The amount of capital authorized for the 693 gas undertakings is £117,869,829, of which £102,924,220 has been paid up and borrowed. The total receipts are £26,760,381; and the expenditure is £21,328,501. The capital authorized for gas undertakings in the hands of Companies and Local Authorities includes other purposes in certain cases. The statistics relating to working show that 13,906,288 tons of coal were carbonized, the number of cubic feet of gas made being 152,007,811,487, of which 140,418,453,827 cubic feet were sold, inclusive of 12,108,452,109 cubic feet of water gas and 81,402 cubic feet of acetylene gas. The totals in the preceding returns were: Coals, 13,610,688 tons; gas made, 147,155,557,421 cubic feet, of which 135,721,696,079 cubic feet were sold—including 10,077,026,210 cubic feet of water gas and 75,239 cubic feet of acetylene gas. At the dates to which the last returns were made up, there were 27,591 miles of mains in use for the supply of 3,713,289 consumers and 605,156 public lamps. The previous figures were: Miles of mains, 26,807; consumers, 3,485,557; public lamps, 581,206.

Comparing the figures furnished by the present returns with those contained in similar returns for the previous nine years, it will be seen that the Companies show as follows:—

Year.	Share and Premium Capital Paid up.	Loan Capital Issued.	Capital Sold under Auction Clauses.	Premiums Realized.
1891.	£34,282,164½	£6,862,117	£4,300,266	£1,823,068
1892.	35,266,898½	7,149,367	4,755,597	2,144,619
1893.	36,491,562½	7,544,563	5,417,667	2,432,970
1894.	37,059,199½	7,739,678	5,715,024	2,637,019
1895.	37,307,330½	7,888,086	5,974,455	2,779,604
1896.	41,433,325	8,185,710	6,783,468	3,512,818
1897.	42,368,976	8,891,218	7,248,545	3,405,345
1898.	44,134,488	9,360,293	7,786,216	3,995,781
1899.	57,937,016	11,451,134	10,031,384	4,301,820
1900.	59,638,877	11,775,642	11,030,474	4,867,124

Year.	Tons of Coal Carbonized.	Cubic Feet o. Gas Made.	Number of Consumers.	Public Lamps Lighted.
1891.	7,071,161	70,953,927,023	1,180,333	282,761
1892.	7,119,189	72,178,028,396	1,213,322	288,021
1893.	6,995,125	71,050,955,154	1,225,253	295,910
1894.	7,128,126	72,610,842,498	1,266,943	295,787
1895.	7,531,131	77,245,618,489	1,339,712	302,015
1896.	7,681,770	80,015,323,004	1,439,272	308,180
1897.	7,963,465	84,040,175,901	1,549,627	314,451
1898.	7,958,669	86,705,722,752	1,670,847	319,007
1899.	8,321,187	91,794,898,282	1,817,649	324,166
1900.	8,426,853	94,869,749,232*	1,945,825	326,813

* Number of cubic feet sold, 87,687,173,615, including 8,945,670,416 cubic feet of water gas.

The somewhat similar figures for the Local Authorities are—

Year.	Amount Borrowed, including Annuities (not deducting Repayments).	Receipts.	Expenditure (exclusive of Amount in the next Column).	Interest, &c., Paid.*	Net Profit after Payment of Items in preceding Column.
1891-92 .	£22,476,180	£5,906,319	£4,589,109	£965,533	£397,947
1892-93 .	22,734,556	5,983,359	4,702,179	994,517	305,040
1893-94 .	23,619,082	6,219,460	4,856,486	1,038,462	341,470
1894-95 .	24,624,554	6,402,046	4,681,035	1,114,014	622,366
1895-96 .	25,624,326	6,478,191	4,881,944	1,126,170	493,886
1896-97 .	26,561,689	6,639,342	4,989,283	1,136,789	534,390
1897-98 .	27,376,324	6,759,883	5,058,705	1,161,171	554,014
1898-99 .	28,614,971	7,177,670	5,365,995	1,219,771	625,780
1899-00 .	29,658,730	8,048,089	6,155,725	1,280,168	663,189
1900-01 .	31,509,701	9,121,418	7,463,693	1,353,259	409,802

* These figures include: (1) Interest paid on loans; (2) amount paid for annuities; (3) amount of loans repaid; (4) amount paid for redemption of annuities; (5) amount placed to sinking fund.

Year.	Tons of Coal Carbonized.	Cubic Feet of Gas Made.	Number of Consumers.	Public Lamps Lighted.
1891-92. .	4,148,131	37,740,332,448	1,172,704	192,323
1892-93. .	3,977,291	39,303,250,095	1,203,574	201,484
1893-94. .	4,025,167	39,730,833,247	1,226,332	210,316
1894-95. .	4,191,175	41,684,838,142	1,257,274	217,069
1895-96. .	4,406,315	44,176,134,202	1,320,059	224,873
1896-97. .	4,614,969	47,026,280,408	1,405,456	232,464
1897-98. .	4,652,688	48,652,558,526	1,475,749	239,352
1898-99. .	4,883,148	51,441,272,030	1,578,291	247,857
1899-00. .	5,289,501	55,360,659,139	1,667,908	257,040
1900-01. .	5,479,435	57,138,062,255*	1,767,464	278,343

* Number of cubic feet consumed, 52,731,280,212, including 3,162,781,693 cubic feet of water gas and 81,402 cubic feet of acetylene gas.

As in the returns for the year 1899-1900, particulars are furnished as to the nature and quantity of materials other than coal used for the manufacture of gas, the supply of water gas, and the maximum proportion of its admixture with coal gas. The extent to which oil, petroleum spirit, carburine, or "other material," is now utilized for the production of gas will be seen from the following list of Companies and Local Authorities who make returns in regard thereto:—

Companies.

Alton.
Bath.
Bexhill.
Bournemouth.
Brecon.
Brentford.
Bridlington.
Brighton and Hove.
Bristol.
Canterbury.
Caterham.
Chigwell.
Cleethorpes.
Coatbridge.
Colchester.
Colney Hatch.
Commercial.
Croydon.
Crystal Palace.
Derby.
Dorking.
Dover.
Durham.
Eastbourne.
Ely.
Enfield.
Epsom and Ewell.
Exeter.
Falmouth.
Faversham.
Folkestone.
Gaslight and Coke.
Godalming.
Gravesend.
Guildford.
Halesowen.
Harrow.
Hartlepool.
Hastings.
Hornsey.
Horsham.
Hoylake.
Hull (British Co.).
Huyton and Roby.
Kingston-on-Thames.
Lea Bridge.
Liverpool.
Longwood.
Maidenhead.
Maidstone.
Musselburgh.
Newport (I.W.).
Northfleet.
North Middlesex.
Norwich (British Co.).
Plymouth.
Portsea Island.
Preston.
Redhill.
Rochester.
Scarborough.
Shrewsbury.
Southampton.
Southend.
South Metropolitan.
Staines and Egham.
Swansea.
Swindon.
Taunton.
Tonbridge.
Tottenham.
Tunbridge Wells.
Tynemouth.
Waltham Abbey.
Wandsworth and Putney.
Watford.
West Ham.
Winchester.
Windsor (also Eton).
York.

Local Authorities.

Alloa.
Alva.
Ardrossan.
Belfast.
Birkenhead.
Birmingham.
Blackburn.
Blackpool.
Broughty Ferry.
Burnley.
Bury.
Chorley.
Coventry.
Darlington.
Dumfries.
Dunfermline.
Edinburgh.
Glasgow.
Halifax.
Hebden Bridge.
Hereford.
Huddersfield.
Ilkeston.
Keighley.
Leeds.
Lincoln.
Llandudno.
Longton.
Manchester.
Middlesbrough.
Padiham.
Paisley.
Peebles.
Perth.
Portsoy.
Rochdale.
St. Helens.
Southport.
Stockport.
Stockton-on-Tees.
Tipton.
Warrington.
West Bromwich.

The new names in the above lists are the Alton, British (Hull station), Caterham, Cleethorpes, Coatbridge, Colney Hatch, Faversham, Hartlepool, Longwood, Portsea Island, Redhill, Rochester, Shrewsbury, Southampton, and Tonbridge Companies; and the Local Authorities at Alloa, Blackpool, Burnley, Dunfermline, Halifax, Hebden Bridge, Leeds, Lincoln, Llandudno, Longton, Padiham, Perth, and Warrington. The Gas Commissioners of Portsoy still return "11 tons of carbide of calcium" under the head of "other materials" used in the manufacture of their gas.

With regard to carburetted water gas, the returns show that when they were made up it was being supplied by the following Companies and Local Authorities; the maximum proportions of its admixture with coal gas being given in parentheses:—

Companies.

Bath (50).
Bexhill (24·25).
Bournemouth (23).
Brentford (41).
Bridlington (av. 33).
Brighton (av. 26·44).
Caterham (20).
Colchester (25·7).
Colney Hatch (av. 9·29).
Commercial (av. 37).
Croydon (av. 28·6).
Crystal Palace (25).
Dorking (50).
Dublin (20).
Durham (30).
Eastbourne (20 to 30‖).
Epsom (30).
Falmouth (33·33).
Faversham (9).
Folkestone (33).
Gaslight and Coke§
Guildford (25 to 33⅓).
Harrow (37).
Hartlepool (av. 16).
Hastings (av. 33·75).
Hornsey (45·11).
Horsham (50).
Hoylake (52*).
Hull—British (24·46).
Liverpool (50).
Lea Bridge (34·7).
Maidenhead (43).
North Middlesex (37).
Norwich—Brit. (58·4).
Plymouth (41).
Portsea Island (29).
Preston (50‡).
Redhill (not stated).
Rochester (25).
Scarborough (av. 23·6).
Southampton (31).
Southend (25·37).
Swansea (24).
Swindon (New) (30).
Taunton (33).
Tonbridge (15).
Tottenham (52·5†).
Wandsworth (35).
Watford.†
Winchester (30).
York (22·61).

* One day only. Water gas not supplied since Oct. 18, 1900. † Supply commenced in November, 1900; so that the maximum proportion of its admixture with coal gas cannot be given. ‡ Average for one week. § The Company supplied 3,118,523,000 cubic feet of water gas. Of the total quantity of gas sent out, 19 per cent. was unmixed with water gas. With regard to the remainder, 66 per cent. contained a maximum proportion of 20 per cent. of carburetted water gas, 12 per cent. a maximum proportion of 30 per cent., 11 per cent. a maximum proportion of 35 per cent., and 11 per cent. a maximum proportion of 42 per cent. ‖ On a few occasions.

Local Authorities.

Belfast (40‖).
Birkenhead (35·48*).
Birmingham (26§).
Blackburn (25).
Burnley (40).
Chorley (8).
Coventry (56·78§).
Edinburgh (10·15).
Halifax (33·33).
Hebden Bridge (2·5).
Lincoln (33·33‡).
Longton (32§).
Manchester (14·28†).
Middlesbrough (33).
Paisley (2).
Southport (av. 9·82).
Stockport (20·41).
Stockton-on-Tees (8·5).

* On one day only. † On the total output; 29·8 per cent. at Bradford Road. ‡ In the day-time; none at night. § On one day only. In the case of Coventry, the proportion for the week in which this high percentage occurred was 38·10.

Since the previous returns were issued, the number of Companies furnishing particulars as to water gas has increased by fourteen; and that of the Local Authorities by six. The new Companies are the Bournemouth, British (Hull), Caterham, Colney Hatch, Alliance and Dublin, Eastbourne, Faversham, Hartlepool, Portsea Island, Redhill, Rochester, Southampton, Tonbridge, and Watford. The new Local Authorities are Burnley, Chorley, Halifax, Hebden Bridge, Lincoln, and Longton.

THE GAS AND WATER STOCK MARKET.

(For Stock and Share List, see p. 159.)

THE Stock Exchange turned over a new leaf last week; and from the disappointing check which it had encountered the previous week, it made a fresh start. The dominant factor was an agreeable conviction that terms of peace were on the point of arrangement. There is nothing settled yet, we know. But the Stock Exchange often exhibits an intelligent appreciation of approaching facts; and it is quite possible that the end is not far distant. Thus the general tendency all round was very cheerful, except where special circumstances prevailed to operate adversely. Consols had a smart rise, though they lost some of it on the announcement of a Local Loans Stock issue at a minimum of 99. Improved dividend rates gave railways a nice hoist; and perhaps the only flat thing was the Yankee Market. In the Money Market, there was an abundant supply, and easy rates ruled. Some were expecting a reduction in the Bank of England rate on Thursday; but it did not come off. However, discount continues very easy; and there is nothing in the air to indicate a coming change the other way. Business in the Gas Market was extremely quiet; and nothing of any particular interest transpired. Movements in quotations were very few in number, and slight in degree, being practically limited to a gain of a point apiece by the two leading issues. But they afforded an indication of a good, steady, and firm tendency underlying the momentary inactivity. In Gaslight issues, only two or three transactions per diem were marked in the ordinary stock at slightly harder figures, rising from 97¾ on Monday to 99 on Friday, which brought the quotation up a point. The Directors announce that the statutory rate of dividend will be maintained in respect of the second half year of 1901; but it involves a further encroachment upon the balance in hand. This balance, which a year ago was £221,570, and fell last August to £97,993, will now be reduced to something under £65,000. The secured issues were firm and unchanged. Quiet, steady business was done in South Metropolitan, at prices which slowly crept up to 126¾; the quotation closing at an advance of a point. Very little business was done in the Suburban and Provincial group; and there were no changes in London quotations. But in the local Exchanges, Liverpool and Sheffield "B" and "C" were quoted at slightly better figures. The Continental Companies were just as inactive as any of the rest; but the small amount of business marked gave indication of solid firmness. The Water Companies were almost absolutely stagnant. Very few transactions were marked; and all quotations opened and closed unchanged.

The daily operations were too colourless to call for detailed notice, things jogging on day by day almost unchanged. South Metropolitan advanced 1 on Thursday, and Gaslight ordinary made a similar advance on Friday.

ELECTRIC LIGHTING MEMORANDA.

The Situation at Walker-on-Tyne—Folly of the District Council—Indifference of the Local Government Board—The Economics of Exchange Telephony.

THE situation that has been created at Walker-on-Tyne by the rash municipalizing policy of the Urban District Council is explained with all necessary particularity in a pamphlet which the "Principal Ratepayers" have had printed, and of which we have received a copy. The story is rather long to repeat in full; but the "short point" is, that the Council of this extraordinary district of shipyards and engineering works fell into the delusion that they knew what was best for the trade of the place as regards electricity supply. They never asked the only possible consumers of electricity in the district—the large works by which the whole place lives—whether this judgment of theirs was correct in the circumstances. They had fallen into the hands of a firm of Consulting Electricians, who estimated that the capital cost of carrying out their powers to supply would be £22,500, inclusive of a dust-destructor and the necessary land. At the local inquiry held in January, 1900, the figures had already swollen to £28,400; and the scheme was opposed by a number of the principal ratepayers, whose opposition proved unsuccessful.

Later, the District Council decided not to generate electricity themselves, but to buy it from a neighbouring Company. The position of the Council is therefore that of a municipal middleman; while the capital investment has risen to £33,259, which is without a generating station originally included in the estimate of £22,500. Originally, moreover, the Council were tickled with the promise of a profit of £500 a year to be available for the relief of the rates. This was based upon the assumption that the interest and sinking fund would absorb £1100 of the revenue. The interest and redemption of the actual loan amount to about £2000 a year; so that, on the face of the undertaking, the expected profit becomes a loss of £400 a year, which is 1½d. in the pound on the rates. But there is no prospect of the undertaking getting off as well as this, because there will be no business from which any profit at all can accrue. The original estimated profit of £500 a year was based on a stated minimum price for the unit, and the local works are at this moment supplying themselves at one-half this figure. It is not, therefore, in the remotest degree likely that they will patronize the municipal speculation.

Meanwhile, protests to the Local Government Board and the District Council proving vain, the Council went on with their job, with the clear prospect that the rates will have to pay about £2100 a year for the loan, besides £1200 a year extra cost of scientifically disposing of the refuse in the destructor, as compared with the old plan of sending it out to sea. This makes an annual charge of £3200 for "the fancy," against no conceivably possible asset. In order to make quite sure that the Council's scheme should not succeed, the cables laid are not suitable for carrying power for the shipyards and engineering works. A more disastrous state of affairs for a locality was never created under the misapplied facilities provided for municipal speculation by the Electric Lighting Acts. It is impossible to exonerate the Local Government Board from complicity in this municipal outrage. If it is the understanding of this Department that there is to be no going behind the demands of a local authority, then the sooner the farce of local inquiries is stopped the better. Here it appeared that the estimates submitted by the District Council were unreliable, and that the only parties who could make the municipal trade successful refused to have anything to do with it—not merely on principle, but because they could do better for themselves otherwise. Yet these objectors were unable to protect themselves from having their rates wantonly increased by 1s. in the pound or thereabouts.

The difficulty of educating the public in the economics of central station supply undertakings comes out very conspicuously in connection with the popular discontent with the terms offered to London telephone subscribers. Notwithstanding the clearness with which it was laid down in the first official communication on this head, that an exchange telephone system increases in cost with the extent of the connections, one cock-sure critic of the Post Office after another rushes into print, or speaks at some public meeting, as though the exact opposite condition prevailed. Lord Londonderry has been very patiently explaining the matter again to the Metropolitan Local Authorities meeting at the Guildhall. Of course, the explanation was not deemed satisfactory. The truth is that those who are attacking the Post Office on this matter are apparently incapable of appreciating the data upon which the charges must be calculated. The newspapers are just as much in the dark. The "Pall Mall Gazette," the other day, sapiently remarked that, with a much lower rate of subscription, there would be three times the number of subscribers at once. Precisely—and how much would the Post Office gain by that? People go on talking about this as though a scale of charges that will pay for exchange telephony for 5000 people ought to suffice for 5 millions. Perhaps the Government might make the economic point plainer if they would state the comparison of charges on the relative number of possible calls-up. For example, if £5 a year provides a subscriber of this sum with the possibility of talking to 5000 people, what should be the cost of his talking to 5 millions? It would then be obvious that there can be no reduction for the larger quantity.

AN AMERICAN FUEL-GAS METHOD AND ITS APPLICATIONS.

RECENT reports relating to the successful application of gas-heating apparatus and utensils to the processes of the Royal Mint, and to fine metallurgical work of all kinds, by the American Gas-Furnace Company, of New York, induced us to make inquiry into the methods adopted by the firm. Curiosity on this point is rendered all the keener, inasmuch as American practice in respect of gas workshop appliances has not hitherto been much in evidence, owing to the dearness of illuminating gas in the United States. One therefore welcomes, as a gratifying indication of the degree in which the American gas industry has already developed in other directions besides that of lighting, any statements going to show that the ingenuity and enterprise of American tool makers are being cultivated in relation to gas, as the efforts of British manufacturers have long been engaged in the same line, and with comparable results. It appears that, in the first place, the American Gas-Furnace Company have found it expedient to make arrangements for the preparation and supply, on the spot, of the fuel gas which their machines require. This is a detail, although an interesting one, because obviously a fuel gas appliance can be adapted to use almost any description of such gas. The chief peculiarity of the special fuel gas system of the American Gas-Furnace Company consists in its being an embodiment, for industrial heating purposes, of the well-known "air gas" principle. When technicians "on this side" think of so-called fuel gas, it can be stated without fear of contradiction that they refer to something made by a "producer," and never of carburetted air in this connection.

There is good reason for this tacit assumption that what is specifically termed "fuel gas" in Europe must also be what French industry knows as "poor gas;" but there is room for argument that as regards the industrial needs of the United Kingdom, at any rate, the capabilities of the carburettor should not be wholly ignored. There are unexhausted possibilities in the "Lucigen" light device, for fuel purposes; and even "air gas" is not to be altogether despised. In the United States, which has always been notorious for "greased air" arrangements, the availability and cheapness of the lighter petroleum distillates is sufficient reason for this reputation. Air-gas for lighting purposes having had its day, there is nothing to prevent the employment of the same preparation for such fuel purposes as it may prove suitable for. This we understand to be the position assumed by the American Gas-Furnace Company. They claim that their air-carburetting apparatus makes an excellent fuel "gas," which is nothing more than petroleum spirit vapour mixed mechanically with air and burnt as made, without storage.

It is scarcely worth while to describe this air-gas apparatus in detail, as the price of suitable spirit in this country prohibits its use in this way. The makers claim that their apparatus will make a "gas" containing all the vapour of about 2 gallons of naphtha of not less than ·760 specific gravity, to 1000 cubic feet of air. This is admittedly the richest mixture that will carry without condensing; and where used in direct connection with furnaces a much smaller proportion of naphtha is used. It is difficult to compare the fuel value of these mixtures directly with that of other gases; but the makers state that, with their arrangement, the quantity of air gas which contains 5 gallons of naphtha is about equal in heating power to 1000 cubic feet of ordinary coal gas. This statement gives the cost of the air gas and its value. In the chief cities of the United States, this naphtha is purchasable at 10 cents per gallon delivered. Therefore, the cost of the air gas of equal fuel value with 1000 cubic feet of coal gas would be about 50 cents for raw material alone, *plus* the power required to run the blower, the interest on capital, and the cost of attendance.

This is really not at all a bad showing. Unlike all "producer" gas plants, this carburetting plant is very compact; and the gas does not need purification. The naphtha has no residue to be removed. It is stored underground in strong tanks. The gas machine itself is not a costly article, apparatus for converting 25 gallons of naphtha per hour into gaseous fuel (the equivalent in heating power of 5000 cubic feet of common coal gas) being priced locally at £700. A small-sized plant, to convert 5 gallons of naphtha per hour, is priced at £220. The apparatus does not carry any extra fire-risk, and appears to be specially suitable for town factories where watchmaking, dental work, and other fine metal work is carried on. By a single adaptation of the apparatus, involving the addition of a small gasholder, the plant is made serviceable in lighting the factory by the help of Welsbach burners. The holder is weighted to give any desired pressure—4 inches is mentioned; and when the stock of gas has run down, the generating machine is connected up and puts into it a mixture which does not contain more than 2 gallons of naphtha per 1000 cubic feet. It is not even necessary to have a holder, where there is no room for it—a relief valve on the main gas-pipe to the furnaces serving to supply the lighting pipes. This gas costs, for material only, 20 cents per 1000 cubic feet; and burns at the rate of 20 feet per hour in a Welsbach "C" burner, yielding 60-candle power light. Several factories are lit in this way.

It is a feature of the air-gas system now in question that the mixture is always made and delivered at a standard pressure of 1 lb. per square inch. It is a really pleasing characteristic of the

American Gas-Furnace Company that in descriptive pamphlets relating to their various specialities, they are remarkably candid and moderate in their claims. For example, in regard to their statement that the oil-gas plant which they have at work supplies their own factory with power, light, and heat at a less cost than they have been able to find similar supplies elsewhere, they distinctly disclaim any suggestion that "the whole thing runs itself." On the contrary, although the attendance is not conspicuous, it is always at hand; and the makers protest against the idea that such plant can be left to take care of itself. Also, in response to many inquiries, it has been necessary to state that gas is not suitable for steam-raising, which is a matter the Company decline to attend to in any way.

One of the most important conclusions that can be drawn from the Company's experience, by English gas engineers, is that common coal gas at 2s. per 1000 cubic feet is competent to run any such factory as that referred to, without fear of comparison with steam or electricity. The American Gas-Furnace Company's equivalent for this form of gaseous fuel, which is common enough in England, is their naphtha air gas, which, for a consumption of 2½ gallons of naphtha per 1000 cubic feet, makes a gaseous fuel of about 300 calories per cubic foot—say, rather less than one-half the heating value of coal gas. The Company will use nothing else besides naphtha, declaring that for their purposes this product of petroleum is best and goes furthest.

So much for the preparation of the American Gas-Furnace Company's favourite fuel. For its utilization industrially, the first requisite insisted upon is a good positive pressure blower. Naturally, the Company make a blower of their own, which appears to be a modified Beale's exhauster. The modification is in the sense of reducing friction and saving power; otherwise the machine is the same. This testimony to the merit of the principle of the Beale's exhauster is worthy of notice; and equally so is the Company's fixed determination not to countenance anything in the shape of a fan. They insist upon obtaining a positive air pressure of 1 lb. per square inch for the satisfactory working of gas-furnaces and other gas-heating appliances; and this is how it is produced. Next, as regards the design and construction of these gas appliances themselves, the Company scout generalities, and lay stress instead upon the prime necessity for the closest possible adaptation of every gas-burning appliance to its particular purpose. Thus, they admit, to begin with, that no single gas-forge can be a perfect substitute for the smith's ordinary coal-forge, which is capable of almost everything that can be put upon it. The ignoring of this truth will only lead to disaster and disappointment, as it has done in the past.

When people sing the praises of gas as fuel, as though the subject admitted of general treatment, they deceive themselves and everybody who gives ear to them. Gaseous fuel is an exact tool, requiring intelligent use. The operations of modern metal working are so highly specialized that they require special appliances for their performance with the highest attainable degree of perfection; and here is where gas heating finds its proper place. Gas fuel is so valuable that it deserves the best treatment. It is not a thing of all work. Gas-forges, for example, must be made for a definite range of work, and for that only. The heating spaces must be adjusted to the purpose to be effected. When all this is properly attended to, the gas forge enables work to be done in a style that cannot be equalled by other fuel. It does its work quickly, uniformly, and with little or no scale. Much tube-welding now commonly and easily effected could not be done at all without it.

It is not our place to advertise particular makes of gas-forges, or anything else; but it is open to be remarked that the manufactures of the American Gas-Furnace Company are very highly specialized, and cover a very wide range of metal working operations. At the same time, they are focussed, so to speak, upon certain very definite industrial requirements. Within their own limits, gas appliances of this degree of elaboration tend to emancipate manufacturers from the fear of the smoke-prevention laws of any country.

BYE-PRODUCTS COKE-OVENS.

In a recent issue of the "Iron and Coal Trades Review," a writer discussed the question of whether the erection of bye-products coke-ovens is likely to be financially successful. He was led to do so by some articles which had appeared in certain technical periodicals, especially one in the "Engineer," the writer of which endeavoured to prove that the beehive oven is the most popular of the coking systems, and that England is wise in adhering to it. The author of the article in the "Review" thinks his opponent dealt with but one or two of the many issues and considerations involved, and these of quite a secondary character. For example, he took only a few products of coal tar; whereas sulphate of ammonia is at present the chief bye-product for which coke-oven plant is erected. The "Review" writer points out that if one wishes to study the financial aspect of the question, the main thing to consider is what quantity of this valuable commodity can be obtained, and what will be the prospects of the sulphate of ammonia market. With regard to production, he is of opinion that at least 1 per cent. of sulphate per ton of dry coal can be safely relied upon from a plant of (say) 60 ovens, corresponding to a production of 1200 tons of sulphate per annum. The net profit, at the present price, is at least £7 10s. per ton; making for the whole a profit of £9000. The price of such a plant being from £40,000 to £50,000, he says it is obvious that the capital outlay is more than likely to bear equivalent fruit, and more so as the profit made by a production of (say) 3 per cent. of tar, or a total of 3600 tons, is not taken into consideration. The only question is the future of the sulphate market. This question he proceeds to consider; noting what has happened in the past, and what is likely to occur in the future. He gives a diagram showing the rapid increase which has taken place in the world's production of Chilian nitrates, and its influence on the market; also England's production of sulphate of ammonia, and the fluctuations in the market since 1885.

The quantity of nitrates rose from about 440,000 tons in that year to 1,310,000 tons in 1900; sulphate rising from 100,000 to 210,000 tons. The average prices of the two articles ranged from 11s. 6d. per cwt. in 1885 down to as low as 7s. 6d. (1897), and then up to 8s. 6d. in 1900, for nitrate; and from 11s. 6d. down to about 10s., then up to 13s. 2d., followed by a drop to 7s. 11d., then a rise to 11s. 3d. in the year 1899 and a drop to 11s. 1d. in 1900. The diagram shows in a striking manner the remarkable influence of the Chilian nitrate market upon the prices of sulphate of ammonia since 1894. The fall in the price of nitrate up to 1897 entailed the same for sulphate; and its subsequent rise is also coincident with better prices for the latter. Besides this reason, however, the rapid recovery of the sulphate market since 1897 is accounted for mainly by the fact that farmers take an increasing and more intelligent interest in the use of this material as a fertilizer, owing to the efforts of the Sulphate of Ammonia Committee and the Ammonia Syndicate of Germany. At the present time, Germany alone uses for agricultural purposes nearly 160,000 tons of sulphate, and, in addition, about 400,000 tons of nitrate, which, in regard to nitrogen, is equivalent to some 300,000 tons of sulphate. The writer of the "Review" article thinks these facts fairly show that no apprehension need be entertained as to the future of the ammonia market, and that it is quite unlikely that any lengthy periods of depression will occur. He admits the possibility that the Mond process may increase the production of sulphate to a considerable extent, and may also temporarily depress the market prices, but not for long. He thinks the evidence given shows that the future fluctuations of the sulphate market will depend upon the nitrate market, and only in a far less degree upon the increasing production of ammonia itself, which will be met by a still greater consumption.

In conclusion, the writer sums up the advantages of a modern coke-oven compared with the beehive oven as follows: Larger production of coke (the modern coke-oven yielding from 15 to 20 per cent. more than its older rival); greater generation of steam by the waste gases; a fair residue of spare gas of high calorific value available for other purposes; and lower working expenses and maintenance charges per ton, and longer life of the ovens. He says the objection will no doubt be raised that the coke produced by a modern oven is inferior to that obtained from the beehive oven, and that about 5 per cent. more coke will be required, as compared with the older system, for blast-furnace purposes; but even conceding this, though he considers it is by no means proved, a solid balance of advantages remains with the modern oven. He admits that objections have been raised to the new ovens on the score of their great expense; but when their advantages are taken into consideration, and also the fact that many constructors are willing to build them on the deferred payment system, he thinks it will be acknowledged that a very real and decided advantage rests with those who are enterprising enough to divest themselves of prejudice, and approach the subject from a modern standpoint.

The "Journal de Physique" for this month contains a short abstract of a paper by P. van der Vlieth on an apparatus for demonstrating the linear conduction of heat; the original paper being in the "Journal of the Russian Physico-Chemical Society." According to an abstract in "Nature," a square bar of iron, measuring 5 centimetres each way, is heated by a jet of steam at one end and cooled at the other by a stream of water. Its lateral surface is covered by a thick coating of felt and cork, and six thermometers are placed in holes made in the bar. After about half-an-hour, the distribution of heat is stationary, and the temperature gradient, as shown by the thermometers, is almost exactly a straight line.

As the outcome of the annual meeting of the members of the German Iron and Steel Institute held during the summer of 1898, arrangements have been made to hold an Industrial Exhibition for Rhenish Prussia, Westphalia, and the adjacent districts, at Düsseldorf, this summer. The Municipal Council have granted a site, comprising 135 acres, on the banks of the Rhine, and about one-third of it is occupied by suitable buildings. On the occasion of the last exhibition, in 1880, only 8·2 acres were covered, out of a total of 44·3 acres. The area of the exhibition in progress will be about one-fourth that occupied by the Paris Exhibition of 1900, and rather less than that of 1867. Considerable interest is being taken in the movement by all the most important firms. The matter calls for notice in our columns from the fact that the annual meeting of the German Association of Gas and Water Engineers will be held at Düsseldorf in June, under the presidency of Herr E. Beer, Manager of the Municipal Water-Works of Berlin.

PERSONAL.

The managership of the Queenstown Gas Company has become vacant by the resignation of Mr. W. M. DONALDSON, who has accepted a more lucrative appointment.

We are pleased to learn that Mr. JOSEPH TYSOE, Engineer in charge of the East Greenwich station of the South Metropolitan Gas Company, has been elected an Alderman of Greenwich; and he received a cordial welcome on taking his seat at the Borough Council last Wednesday.

The appointment of District Superintendent at the Malta station of the Malta and Mediterranean Gas Company has been filled by the selection of Mr. W. A. REID, who has for some few years held the position of Manager and Secretary of the Longford Gas Company. Mr. Reid is the immediate Past-President of the Irish Association of Gas Managers.

There were 42 applications for the position of Manager of the Sowerby Bridge Gas-Works, which will become vacant at the end of March by the resignation of Mr. John Marsland. The Gas Committee of the District Council requested six of the applicants to have an interview with them, and eventually selected Mr. A. W. BISSETT, of Birkenhead, for the position.

In response to the recent advertisement in the "JOURNAL" for a Superintendent for the Jarrow Gas-Works, 33 applications were received, and the Directors of the South Shields Gas Company have selected Mr. JOHN MERRILL, who is at present general foreman to the Sutton, Southcoates, and Drypool Gas Company, at Hull. He was formerly at Mossley, under his father.

On Monday of last week, Mr. J. W. Helps, the Engineer and General Manager, and Mr. W. W. Topley, the newly-appointed Secretary, of the Croydon Commercial Gas and Coke Company, entertained the members of the staff, to the number of about 50, at a dinner given at the Café Royal, Croydon. Advantage was taken of the occasion to present to Mr. W. J. RUSSELL (who, after 39 years, of service, has been given a seat on the Board) a silver salver, suitably inscribed, as a mark of the esteem and respect with which he is held by them. Mr. Charles Hussey, J.P., the Chairman of the Company, Mr. Douglas H. Helps, of Redhill, and Mr. W. Price, of Reigate (past members of the staff), were also present. In making the presentation, Mr. Helps referred to the career of Mr. Russell as an example of what can be done by industry and self-improvement, and as an incentive to every member of the staff, from the juniors upwards, to do their best to merit promotion by similar diligence and study.

OBITUARY.

GEORGE HENDERSON.

By the death of Mr. George Henderson, which occurred at Bodmin on Thursday last, at the age of 85, there passed away one who was intimately associated with the foundation and much of the subsequent history of the Plymouth and Stonehouse Gas-light and Coke Company. Gas was first introduced to Plymouth by the United General Gas Company, who also established gas-works in Dublin, Cork, and Limerick. So far as Plymouth was concerned, it appears to have been a very small undertaking, of which nothing now remains but the initials "U. G. C." on a few old lamp-pillars still standing in some of the streets. The price was high—ranging from 9s. where the supply was furnished by meter (which, it may be mentioned, was only done as a favour), to about 15s. when the charge was "per burner." In the circumstances, the demand was necessarily small, and the local opposition to the Company great Mr. Henderson took a leading part in the formation of a new Company, whose object was to supply gas at a more reasonable figure. He personally initiated the scheme, and canvassed the inhabitants to persuade them either to take shares in the Company or to become consumers of its gas. In 1844, the new Company went to Parliament for powers. The United Gas Company opposed them unsuccessfully, and the Act establishing the Plymouth and Stonehouse Gas Company was passed. Mr. Henderson, who was responsible for its birth, was appointed Secretary. With the object of forestalling the opposition of their rival, the United Gas Company immediately dropped their price to 6s.; and when the new Company began to supply gas, they further reduced the charge to 4s. On the advice of Mr. Henderson, the new Company declined to be drawn into a war of prices. Many of their customers were also shareholders, and others seem to have had sufficient confidence in the concern to prefer its gas at 6s. to that of the older undertaking at 4s. per 1000 cubic feet. As in most other cases where competition was sanctioned, the rivalry did not last long. In September, 1848, the United Gas Company retired from the field, and their plant was bought by the Plymouth and Stonehouse Company. Mr. Henderson continued to fill the position of Secretary until 1878. On his retirement, he was appointed a Director, and a few months later Chairman of the Company. The latter office he held until a year or two ago, when, in consequence of increasing age and infirmities, he retired both from the Chair and the Board.

During his long connection with the Company, Mr. Henderson had the satisfaction of witnessing and promoting the constant development of the undertaking. Established to supply cheap gas, the Company kept this policy steadily in view; and in 1887, when the price came down to 1s. 9d., they were able to boast of supplying the cheapest gas in the kingdom. This was due in no small degree to the care with which the capital expenditure was nursed, and to the general good management of the concern. In 1879, the Company went to Parliament for an extension of their powers; and, though strongly opposed by the Corporation, they had little difficulty in proving that they had done well by the consumers, and were deserving of future confidence. By this Act the Company adopted the sliding-scale; and though they have since had occasion to obtain further capital powers, and have had to meet the inevitable opposition of the Municipal Authority, its effect has only been to demonstrate that the position of the Company is really impregnable. In August, 1887, Mr. Henderson, was presented with his portrait, painted by Mr. Fellowes Prynne; and it now hangs in the Board-room of the Company's offices, with an inscription which records that it was "subscribed for by the Directors and officers as an expression of their sincere regard, and in recognition of the eminent services he has rendered to the Company."

On his retirement from the active duties of the secretaryship, Mr. Henderson went to live at Bodmin, his native town. He was appointed a Magistrate for the borough and the county, was a member of the Board of Guardians, and an Alderman of the Cornwall County Council.

Mr. JAMES BARCLAY, the Manager of the Banchory Gas Company, Limited, died at the gas-works there last Friday week.

The death took place, on Tuesday last, of Alderman CHARLES READ, who from 1890 up till about a year ago was Chairman of the Coventry Corporation Water-Works Committee. Deceased, who was 72 years of age, had been in failing health for some time past; but on the day in question he started off to attend meetings of the Water Committee and City Council, of which he had been a member for over a quarter-of-a-century. Feeling ill on the way, he returned to his residence, where he died suddenly while seated near his desk. Deceased leaves a widow, two sons, and three daughters, with whom the City Council passed a vote of condolence immediately on learning of the sad event.

NOTES.

Carbide as the Heating-Agent of the Future.

A sanguine view of the rôle which carbide will play as a heating agent in the future has been taken by Herr A. Gawalowski in an article which he has contributed to an Austrian chemical journal. It is, he believes, destined to afford a remedy for scarcity of coal and other fuel. It is to place mankind in the position to obtain heat, light, and steam indirectly from water and limestone; as 150 lbs. of lime and 100 lbs. of carbon yield 150 lbs. of carbide, which produces over 720 cubic feet of acetylene gas—excellent for both heating and lighting. But the reaction by which carbide is obtained from lime and carbon, produces carbonic oxide, and requires a temperature of 3500° C., which is only to be attained by means of an electric current of 350 amperes at 70 volts. This current is obtained most advantageously from dynamos driven by water-power; and thus a fuel is produced from water (as power), lime, and carbon. But as the technical paper, "Glück auf," quite properly points out with reference to Herr Gawalowski's statements, it is necessary in the first place to find some use for the carbonic oxide which is produced from one-third of the carbon consumed, and in the second place to bring into the reaction the carbon contained as carbonate in the limestone. If these aims could be accomplished, carbide might actually become a cheap source of heat.

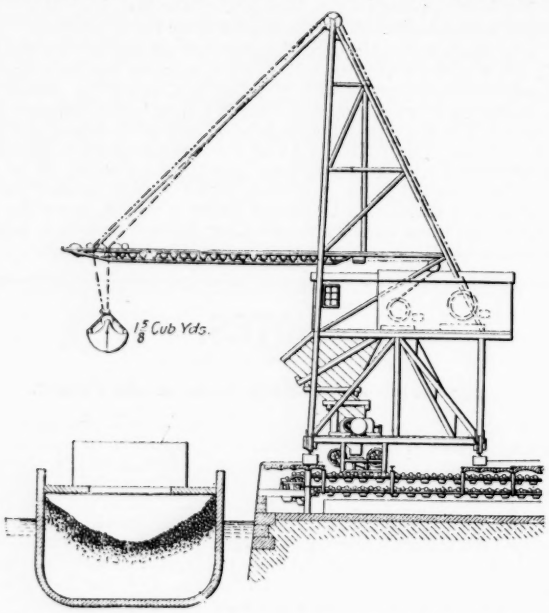
Hints for Engineering Draughtsmen.

Some useful hints for beginners in an engineering drawing office were offered by Mr. R. G. Manning, in the "Journal of the University of Michigan Engineering Society." He described the routine work in the drawing office of a Bridge Company in the United States. The drawing on paper is in pencil only, traced in ink on cloth. One of the draughtsmen is told off to be "checker;" his duty being to check every dimension on the drawings and see that there is nothing lacking to their completeness, intelligibility, and conformity with the specification. He puts a tiny dot in waterproof red ink under every figure as it is checked, and marks all corrections in blue pencil, so that they may be easily seen. After all the corrections have been attended to by the draughtsman who made the drawing, the sheet is returned to the checker with his blue pencil marks untouched, in order that he may see if these have been carried out. No draughtsman should check his own work. The absolutely essential equipment for a draughtsman is as follows: Two 45° set squares, 4-inch and 10-inch, two each 30° and 60° squares, 5-inch and 13-inch; two good ruling pens; one good, heavy 42-inch T-square; one pair dividers; one bow pen and pencil; scales; pencil and ink erasers; knife; and a piece of soap-stone to rub down erasures in tracing cloth. Transparent set squares and scales are the best. A few of the "wrinkles" of the drawing office are given: Blue and black pencil marks are removable from tracing cloth with benzene. Tracings should lie on waste paper, as the fluid goes through. White ink for writing on blue prints, and fluid indian

ink, should be bought. Trace on the rough side of the cloth, which helps (with the aid of a heavy border) to correct the tendency to roll up towards the glazed side. Full, light, black dimension lines are used, being quicker to make than either dotted or red-ink lines. There is quite enough contrast between these light lines and the strong lines in which the object is drawn to obviate all risk of confusion. There is a printing appliance in use in America for putting titles on drawings which is said to save much time.

Steel-Concrete Construction for Power Stations.

A recent number of the "Engineering Record" contains some instructive particulars relating to the design and construction of the new power station of the New York Edison Company, who supply electricity for lighting and other purposes, except traction. This establishment is intended to supersede all the small and scattered generating stations now in use, which will become converting and distributing sub-stations; the whole of their generating plant, which is scarcely ten years old, being "scrapped." As an indication of the kind of engineering building found necessary for housing powerful machinery in rapid motion, the new structure is constructed with a strong framework of steel. Every part of it, floors, walls, roofs, was put together in skeleton first, and the steel frames were afterwards covered up with expanded metal and concrete, faced with brick and terra cotta. The brickwork



and concrete, however, have nothing to do with the stability and strength of the building, which depends upon the steel columns and beams. Only Babcock and Wilcox water-tube boilers are installed, which is another strong indication of the favour in which boilers of this particular type are still held by many large users of steam. The engines of the new station are Westinghouse three-cylinder inverted motors, condensing, of 8000-horse power. Of these, there will be sixteen when the station is fully equipped. We illustrate the coal-discharging arrangement on the wharf. Underneath is shown the line of bucket conveyors which take the coal to the elevating conveyors. The apparatus comprises a stiff-beam travelling crane, running on rails along the wharf; a grab; and a coal-crusher. The coal is automatically weighed further on.

Another Town Acetylene Supply.—The most promising development of the acetylene industry certainly lies in the supply of small towns where coal and oil are dear, and where a public coal-gas works would scarcely be of a sufficiently large size to be remunerative to its owners. Many such towns are to be found in the heart of the Continent of Europe—especially in the Austrian and Russian dominions; and several in the Austro-Hungarian empire have already adopted acetylene. One of the latest to construct a public acetylene supply works and distributing system is the small town of Strakonitz, in Bohemia, which has about 8500 inhabitants. Generators on the "carbide-into-water" principle have been erected, in conjunction with condensers, washers, purifiers, drying apparatus, and a gasholder. The holder has an available capacity of 1770 cubic feet; and the gas is distributed from it through a works meter and pressure-regulator to the town. The distributing system is wholly of wrought-iron pipes, and is three miles in length at present; but it is to be extended by a further two miles in the spring. There have so far been only 22 houses, having about 280 burners, connected with the installation, in addition to 86 street-lamps. Later on, however, 60 more street-lamps will be supplied. The greatest consumption per diem during October last was 710 cubic feet. The price charged for the acetylene is equivalent to about £2 7s. per 1000 cubic feet.

TECHNICAL RECORD.

A CONTINUOUS PROCESS FOR MAKING A MIXED GAS OF UNIFORM COMPOSITION.

The following is an abstract translation of a paper contributed by Dr. Besemfelder, of Charlottenburg, to a recent number of the "Journal für Gasbeleuchtung." Apart from the description of his new process for making gas, the paper gives an interesting review of the principles underlying the working of other well-known processes.

The close of the past century witnessed some great advances in the processes for transforming the heating power of coal into a transportable form. Firstly, the old distillation process, with external heating, as used in coal-gas manufacture, began to be discarded in favour of the producer process with internal heating. Secondly, it was recognized that it was much more advantageous to burn so much coal completely into carbonic acid instead of only to carbonic oxide, as thereby a store of heat was secured in the generator which sufficed to supply the heat required for the decomposition of steam for a much longer period, or continuously, as in the Dellwik and Dowson processes. Yet these methods of gas making have grave disadvantages, despite the very high duty which is obtained from the fuel by them. Thus they can be applied only with anthracite, coke, or other non-bituminous fuel; while about a third of the heating value of these materials is lost so far as the gas-making process is concerned—chiefly through the heat which is carried out of the generator by the gas made.

The attempts made by Dr. Strache, with great expenditure of trouble, toil, and thought, to gasify bituminous coals, lignite, &c., in water-gas generators equipped with every care, show, by the low duty obtained in practice of about a third, as demonstrated by Herr J. Körting *, that it is impossible to gasify rich gas coals directly in a generator with satisfactory results. So long as the material introduced into a generator can evolve gas, the evolution of that gas withdraws so much heat from the incandescent carbon that it is not possible to secure the necessary high temperature for the dissociation of steam.

The failure of all such attempts can be comprehended on considering the slow rise of temperature which occurs in a coal-gas retort, notwithstanding that large supplies of heat enter it from outside. Heintz showed, in 1866, by the melting of different alloys, that there are different temperatures prevailing during the different periods of gasification in the retort. When the retort had just been charged, he found that the temperature was very low, and only rose to 790° Fahr. after one hour had elapsed. He was studying Upper Silesian coal worked off in six-hour charges. After three hours, the temperature had risen to 1760° Fahr., and by 5½ hours to 1970° Fahr. The latter is the temperature which, according to the researches of Bunte and Harris,† is required for the complete dissociation of steam in the presence of incandescent carbon. The temperature of the setting, during Heintz's tests, was throughout 2550° Fahr.

The results of the gasification of coal by Strache's process, in which all the valuable bye-products of gas manufacture are destroyed for the sake of the gas, are consequently no better than if the coke resulting from the same quantity of coal were alone used for gas making. But in generating gas from coke, the more simple Dellwik generator gives equally good results—viz., a fuel consumption of from 25 to 31 lbs. of good coke per 1000 cubic feet of water gas made.‡ According to Strache's own trials, 31 to 39 lbs. of good coal are required to make 1000 cubic feet of water gas. Assuming that the same coal yields 65 per cent. of coke, the 39 lbs. of coal become about 25½ lbs. of coke, which, on the basis of the Dellwik results quoted above, will, by itself, yield 1000 cubic feet of water gas.

This disadvantage of the direct gasification of coal in generators must inevitably be found in every attempt in that direction. Instead of striving against the natural law, it must be utilized. This can be done through the amounts of heat which the gases formed in the generator by the gasification of the coke carry out of it. They can be applied to carbonize the coal free of expense, with the production of valuable bye-products, and to deliver thus incandescent coke without access of air into the generating chamber.

How great are these amounts of heat can be realized from the following calculation, based on the working results of the Dellwik process on a large scale. According to Dicke, the Dellwik water gas contains on the average;

39·96	per cent. of carbonic oxide	=	214·5	ozs. of carbon	per	1000 c. ft. of gas
0·55	,, ,, methane	=	3·0	ozs.	,,	,,	,,
4·85	,, ,, carbonic acid	=	25·7	ozs.	,,	,,	,,

Hence 1000 cubic feet of water gas contain 243·2 ozs. = 15·2 lbs. of carbon.

Now practical results of the working of the Dellwik process show that, on the large scale, 31·2 lbs. of coke are required to produce 1000 cubic feet of such water gas. Coke contains on the

* See "JOURNAL," Vol. LXXVII., p. 1378. † *Ibid*, Vol. LXIII, p. 484.
‡ Körting's paper in "JOURNAL," Vol. LXXVII, pp. 1125, 1223, 1310, 1377.

average 90 per cent. of carbon; so that there remains over for the blow gases ($31{\cdot}2 \times 0{\cdot}9$) $- 15{\cdot}2 = 12{\cdot}88$ lbs. of carbon per 1000 cubic feet of water gas made. The blow gases contain, on the average, 18 per cent., by volume, of carbonic acid, 79 per cent. of nitrogen, and 3 per cent. of residual gas—mostly oxygen. The 12·88 lbs. of carbon, when burnt to carbonic acid, consume 34·35 lbs. of oxygen. In calculating the volume of blow gases, it must be remembered that this oxygen represents only 18 per cent. of the air, and not the 21 per cent. which, according to the theory of the Dellwik process, is replaced completely by carbonic acid. Hence the quantity of air blown in for the purpose of getting up heat in the generator becomes increased in the ratio of 18 to 21, or the oxygen in the air used amounts to $\frac{34{\cdot}35 \times 21}{18} = 40{\cdot}07$ lbs. per 1000 cubic feet of water gas made. The nitrogen in the air corresponding to this weight of oxygen is $40{\cdot}07 \times 3{\cdot}31 = 132{\cdot}63$ lbs. Hence the blow gases formed, when 1000 cubic feet of water gas are made from coke containing 90 per cent. of carbon consist of—

47·23	lbs.	(12·88 + 34·35) of carbonic acid.
5·72	,,	(40·07 − 34·35) ,, oxygen.
132·63	,,	,, nitrogen.
185·58	lbs.	= total weight of blow gases.

The blow gases leave the generator at about 1832° Fahr. (1000°C.). The specific heats of the constituents are (per kilogramme): Carbonic acid 0·217, oxygen 0·218, nitrogen 0·244 calories. Thence it may be calculated that the 185·58 lbs. of flue gases leaving the generator at 1000° C., carry away 19,895 calories. To this must be added the heat taken away from the generator by the water gas itself, which, according to Dr. Strache's exhaustive investigation, amounts to 8665 calories per 1000 cubic feet. So that the production of 1000 cubic feet of water gas made by the Dellwik process entails $19{,}895 + 8665 = 28{,}560$ calories being carried away from the generator in the gases. But the 31·2 lbs. of coke, containing 90 per cent. of carbon, used in the generator in the production of the 1000 cubic feet of gas, will represent—taking the calorific power of carbon at 8080 calories per kilogramme—102,900 calories. Hence the heat continuously carried away by the gases signifies a loss of heat in the Dellwik process of $\frac{28{,}560 \times 100}{102{,}900} = 27{\cdot}75$ per cent.; or the process shows an efficiency of 72·25 per cent., which agrees with the results obtained by Dr. Bunte in his recent researches.

In coal gas manufacture, with the retorts heated by producer gas, the weight of coke consumed for heating amounts to from 19 to 18 per cent. of the weight of coal carbonized. The following calculation is based on a mean amount of 14 per cent.: 100 lbs. of coal require for their carbonization 14 lbs. of coke, containing 90 per cent. of carbon, which will afford by its combustion 46,180 calories. The coal yields about 65 lbs. of coke. But it was shown above that the heat carried away from the generator, when 31·2 lbs. of coke are consumed by the Dellwik process for the production of 1000 cubic feet of water gas, amounted to 28,560 calories, which is equivalent to 915 calories per pound of coke consumed. Now if coal were first carbonized or gasified by means of this lost heat, and the incandescent coke obtained from it were immediately applied for making water gas, there would be available for the carbonization of 100 lbs. of coal the following amount of heat—viz., $65 \times 915 = 59{,}480$ calories. Hence there is an excess of $59{,}480 - 46{,}180 = 13{,}300$ calories per 100 lbs. of coal carbonized, in favour of the method of carbonizing the coal by means of the products formed in converting the coke obtained from the coal into gas. Even in the extreme case of a coal which required 18 per cent. of its weight of coke for its carbonization, there would still be a slight excess.

There are two ways in which more heat might be provided for carbonizing, in cases where it was required—viz. (1) By the addition of a sufficient quantity of coke to the generator from external sources; and (2) [applicable at least to the gasification of coal] by a rational co-ordination of the carbonizing and generator processes, without further addition of coke. The first way presents no difficulties, when there is no question of economy or of attaining other ends. Hence, only the second way, which technically is of greater interest, will be discussed here in detail.

Coal gas manufacture, entailing the consumption of upwards of 18 lbs. of coke per 100 lbs. of coal gasified, suffers from two principal errors—viz., (1) That the working is periodic; and (2) that the coke is thrown out in an incandescent state from the retorts. These will be considered in order. Periodic working entails the sudden introduction of the cold material into a clay vessel heated to full white heat—a faulty procedure, which is opposed to all chemical and physical laws. The natural consequence is that the vessels or retorts are continually being cracked. Thus air gains access to them, or gas escapes, according to the fluctuations of pressure. The oxygen of the air naturally burns a portion of the coal to carbonic acid; and this is, of course, lost so far as gas production is concerned.

The cracks must be stopped, when the charge is drawn, at an expenditure of time, wages, and material, while the hot retort remains open. The nature of the gas, however, to a certain extent affords a remedy for this evil; for those constituents which are subjected to great heat on the walls of the retort, with the object of securing thorough carbonization in all the retorts of the setting, split off carbon, which forms a protecting layer on the walls of the retort. This layer constitutes a valuable bye-product—retort scurf. But through its formation, a portion of the coal has been diverted from its true end, the illuminating power of the gas has been diminished, and the transmission of heat through the retort has been considerably obstructed by the ever-growing layer of carbon. The tedious burning off of the carbon entails still further loss of time, labour, fuel, and heat; while the retort suffers from the excessive heating to which it is then subjected.

The discharge of the coke from the retorts in an incandescent state entails not only the loss of all its sensible heat, but also a not inconsiderable loss of carbon through combustion of the coke owing to the access of air before it is quenched. But reckoning *only* those quantities of heat which are lost through the escape of the hot gases, and through the discharge of the coke while incandescent, it is evident that with a process which avoids the two principal errors, and combines carbonization with generation, the heat conveyed by the gases from the generating process will, in all cases, amply suffice to effect the carbonization of coal without any further expenditure of fuel.

Schilling has stated in his work on coal gas that a bed of nine retorts carbonizes 8·07 tons of coal per twenty-four hours, and that a ton of coal yields, on the average, 10,765 cubic feet of gas. The setting was at a mean temperature of 2174° Fahr. (1190° C.); and the gas evolved during twenty-four hours amounted to nearly 86,880 cubic feet. The gas, according to Perissini's researches in 1880, must emerge in the mouthpiece of the retort at a temperature of $\frac{1190}{2} = 595°$ C., weigh 14·72 kilogrammes (32·46 lbs.) per 1000 cubic feet, and have a specific heat of 0·48 (per kilogramme). Hence the amount of gas produced in the setting per day carries away $86{\cdot}88 \times 14{\cdot}72 \times 0{\cdot}48 \times 595 = 365{,}250$ calories. The coke produced amounts to $8{\cdot}07 \times 0{\cdot}65 = 5{\cdot}25$ tons, or 5330 kilogrammes. It would be discharged from the retorts at a temperature of 1190° C. (2174° Fahr.). Taking its specific heat at 0·2031, there would be thus taken from the setting to no purpose

$$5330 \times 0{\cdot}2031 \times 1190 = 1{,}288{,}000 \text{ calories.}$$

According to Schilling, only 13½ cwt., or 677 kilogrammes, of carbon have to be burnt in carbonizing the 8·07 tons of coal; so there are brought into play only $677 \times 8080 = 5{,}470{,}160$ calories, The 1,288,000 calories lost in the discharge of the hot coke alone represent 23·5 per cent. of the heat of the carbon actually consumed for carbonization. Taking this percentage on the calorific value of the maximum amount of coke consumed in carbonizing coal—viz., 18 per cent. of the weight of the coal carbonized—it appears that, if the incandescent coke is conveyed directly to the generator, the heat resulting from the combustion of this diminished amount of fuel requisite for heating the setting is actually only 76·3 per cent. of that available from the gases formed when water gas is made from the coke produced from the coal. Moreover, in water gas processes, the coke has hitherto been introduced into the generator in a cold state, and must therefore first be raised again to a temperature of about 1832° Fahr. (1000° C.) before it can effect the decomposition of steam and produce water gas. Hence it is evident that a direct connection of carbonization and water-gas generation must result in a far higher utilization of the heating value of the coal; and this naturally can be directed to the enlargement of the make of mixed gas.

Walton Clark, of Philadelphia, first recognized the great economy in the consumption of coal which was secured by thus uniting the two processes. He avoided the second of the two principal inherent faults of the coal gas manufacturer—viz., the cooling of the incandescent coke before it was used in the generator. He even did more, he used the two different descriptions of gas formed in the generator for heating the carbonizing retorts separately, by conducting the water gas into the retorts, and burning the producer gas for heating the bed of retorts. But he did not see how to overcome the first of the two inherent faults of the coal-gas process—viz., the periodic working with all its attendant evils; and consequently he did not succeed in obtaining a uniform and continuous production of a mixed gas.

(*To be continued.*)

GREYSON DE SCHODT'S INCANDESCENT GAS-BURNERS.

At the Meeting of the Dutch Association of Gas Managers last summer, M. Greyson de Schodt read a paper on "Intensive Gas Lighting by Incandescence." It was devoted mainly to a recapitulation of the leading principles underlying this system of illumination, and their application to the production of the burners with which the name of the author is associated. We have received a print of the paper in pamphlet form from M. Greyson, and take therefrom the following particulars.

The growing demand for more light which has been a prominent feature of the progress of the gas industry during the past decade has rendered the ordinary incandescent burner too small a unit. The multiplication of these units, or light-centres, being inconvenient in practice, there has been a very decided movement in the direction of employing high-power lighting. Moreover, the increased use of the electric light has stimulated gas managers to compete with it by the introduction of economical burners. The author has been engaged for several years in endeavouring to

augment the light-giving capacity of incandescent gas-burners; and the results of his labours have served as a basis for the construction of his appliances. An examination of the systems generally in use led him to the conclusion that the maximum luminous intensity is not obtained with the hottest flame, but with the flame which leaves available a certain quantity of carbon in a nascent state in the vicinity of the mesh of the mantle; in other words, that it is this carbon which plays the predominant part—it may be either calorific or chemical—in luminescence. It is evidently not the former, as the experiments of Professor Lewes show that the temperature of the outer zone of an atmospheric flame with a green cone is 1511° C.; while Dr. Bunte estimates at 2000° C. the temperature reached by the fabric of the mantle. It must be concluded, therefore, that it is chemical, and that it takes place only when the elements are present in definite proportions—that is to say, when a certain quantity of carbon in the flame acts upon a certain quantity of oxide of cerium in the mantle. It is this condition of things, in combination with the calorific action developed by the flame, that has produced the luminous effects which have so completely revolutionized the gas industry.

The first application of this principle to intensive gas lighting by incandescence was made by the author in the production of his high-pressure burners. Here, by means of special arrangements, the primary combustion was effected by considerably augmenting the proportion of air drawn in. The result was that, owing to the richness of the mixture in oxygen and nitrogen, if the flame was hot it was likewise very short, and the available carbon elements were present in too small a quantity to produce the chemical reaction of incandescence. Consequently, in endeavouring to effect this, if a mantle having an ordinary surface was used, it was necessary to burn three times as much gas as if the primary mixture were a little oxygenated. A very good result

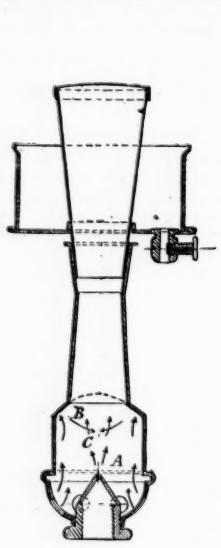


FIG. 1.

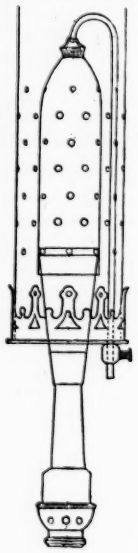


FIG. 2.

GREYSON DE SCHODT'S LOW-PRESSURE BURNERS.

was obtained, as the great primary heat developed (the flame being at a very high temperature) had the effect of driving the hot gases with some force against the mantle, which facilitated the oxidation of the carbide of cerium formed.

The experiments made by Professor Lewes with the Greyson high-pressure system were very satisfactory, inasmuch as, with a consumption of 10·63 cubic feet of gas, a light of 322 candles was obtained. The drawback to the system, however, lay in the fact that, the gas being generally supplied to the consumers at a lower pressure than was required for the burner, special appliances were necessary for increasing it; and for private houses their installation presented certain inconveniences. The application of the author's "Rational" high-pressure system also has, for this reason, been confined to large industrial establishments; and therefore he has been led to apply to ordinary lighting, at the usual pressures, the principles embodied in that system. Owing to the smaller quantity of air drawn in, the primary combustion is not so complete. The result is that the amount of disposable carbon is greater, and that, in order to have an intensive burner, a very much larger mantle has to be used—one, moreover, in which the cerium is present in proportion to the quantity of carbon in the nascent state. In addition, special arrangements have to be made to bring on to the mantle, with a certain amount of force, the air required for secondary oxidation. The application of these principles led to the production of the author's low-pressure burners, two of which are shown in the accompanying illustrations.

Fig. 1 is a No. 3 burner, one-half the natural size. From a single-jet injector the gas passes into the chamber A, which is perforated with holes obliquely in a direction parallel with the cone of the injector. The stream of gas draws round it a sheath of air which comes in contact, at the upper part of the chamber, with a parabolic surface B, the focus of which is at C. The chamber is surmounted by a convergent-divergent cone, above which is a piece of wire gauze supporting the mantle—a closed gallery and a perforated chimney completing the appliance. The action of the burner is as follows: The air-sheathed jet of gas strikes the parabolic top of A, and a whirling motion is set up, which brings the elements together. The effect of this movement would be to impede the passage of the mixture, were it not for the fact that the contracted portion of the cone accelerates the speed of the mass. On reaching the wider portion, it expands proportionately with the heat of the burner, and reaches the space above the gauze with its elements well combined. The air-holes are so arranged that the mixture above the gauze shall not be so rich in oxygen as to cause complete combustion, notwithstanding the relatively high temperature. The result is that some of the hydrocarbons are imperfectly decomposed, and carbon in the nascent state is still disposable under the fabric of the mantle. The closed portion of the gallery causes streams of air to strike the surface of the mantle obliquely, which facilitates oxidation, and produces luminescence of peculiar brilliancy and of special tint. In order to obtain the highest result, the holes in the chimney should be cut obliquely, and should decrease in size according to the quantity of air necessary.

The burner shown in fig. 2 is a No. 0, one-third the natural size, furnished with its chimney. In this model, incandescence is greatest at the lower part, where the air enters. According to experiments made in the Municipal Laboratory in Paris, these burners gave a light equal to 104 candles, with a consumption of 99 litres (3½ cubic feet) of gas. M. Richard, formerly Chemist to the City of Brussels, found that burners Nos. 1 and 3 gave, with consumptions of 125 and 220 litres (4·41 and 7·76 cubic feet) of gas, a light of 120 and 220 candles respectively at a pressure of 32 mm. These burners were furnished with chimneys having ordinary holes, and with mantles made by the well-known method. These results, which are very satisfactory, are possible of improvement when the Plaissetty mantle becomes an article of commerce.

RIEDLER GAS AND AIR COMPRESSORS.

The air and gas compressors introduced in Germany by Professor A. Riedler, of Berlin, have, in a very few years, obtained a world-wide reputation and application. The sole rights for manufacture for Great Britain and the Colonies are held by Messrs. Fraser and Chalmers, Limited; and we learn that they have supplied, within five years, to many parts of the world compressors equivalent to 60,000 indicated horse power. The success obtained by this form of compressor has been achieved by the use of valves mechanically operated. Under this method, Professor Riedler was able to accomplish in air and gas compressing what, it is stated, others were unable to do before—viz., "high speeds with corresponding high piston speeds, at the same time obtaining maximum efficiency with minimum wear and tear." The speed of the compressor generally varies from 80 to 100 revolutions, while the piston speed varies from 500 to 700 feet per minute. Positively controlled valves enable the use in the system of few and large valves; thus securing wide openings and free passage, and thereby "avoiding all the disadvantages of automatic or self-acting valves, which always require a very small lift throttling the passages, and make large numbers of small valves necessary." In brief, without going into the computations given by the makers in proof, we are assured that eight automatic valves of at least 4 inches diameter are necessary to do the work of one 7-inch Riedler valve. Many of these compressors are in use in machine shops for driving pneumatic tools. Hauling, transmission, pumping, and hoisting are other employments; and they have come into favour in chemical works, where, on account of the non-leakage and fewness and accessibility of all working parts, such a compressor is especially desirable. More recently, owing to the speed at which the Riedler is able to run, combined with its simplicity and economy, it has been directly connected to gas-engines; and in Germany, there are now several installations where the Riedler blowing-engines are worked direct-connected to engines operated by blast-furnace gases.

A Memento of the Visit of the Societe Technique to London.—We learn from a letter received from Mr. Walter T. Dunn and Mr. Thomas Cole, the Secretaries of the Joint Reception Committee of the Institute and Institution which was formed to carry out the arrangements in connection with the visit of the members of the Société Technique to London last July, that, in commemoration of the event, the Society have presented to each of the above-named bodies a medal beautifully produced in oxidized silver, with the name of the recipient engraved upon it. The writers of the letter say: "We venture to think that many of your readers will be interested to know of this characteristic act of courtesy on the part of the guests whom the two Societies had the honour of entertaining. Actual size photographs of the medal are enclosed, which you may possibly desire to have reproduced for insertion in your next issue." It has not been deemed necessary to reproduce the photographs referred to, as (with the exception of the name on one face) the medal is precisely similar to that issued by the Société Technique in commemoration of the International Gas Congress at Paris in 1900, and which was illustrated in the "JOURNAL" for Jan. 1 last year.

PURIFICATION AND STERILIZATION OF WATER.

At the Society of Arts, on Monday last week, Dr. SAMUEL RIDEAL, F.I.C., delivered the first of a series of four Cantor Lectures on the above subject. He was introduced by Sir W. H. Preece, who briefly referred to the interest attaching to the subject, and to the qualification of the lecturer to deal adequately with it.

Dr. Rideal opened his discourse, which was devoted to the first of the four methods in use for the purification of water—namely, by uncontrolled natural agencies—by detailing the conditions of purity, and the influence of physical and chemical properties on the fitness of a water for public supply. He pointed out that physical character is no guide to purity, as clear water may contain solids in suspension. With regard to turbidity, the late Sir Edward Frankland and Mr. W. J. Dibdin were fairly in agreement on the subject—the former giving 0·0046, and the latter 0·0014 to 0·008 part per 100,000 parts. The colour of water was an important index to its quality. The presence of *algæ* would give it a green tint; peat, a brownish hue (Liverpool water had this tint); but pure water should be blue-green. The lecturer exhibited Lovibond's tintometer for observing the colour of water, and explained its construction and the manner in which it is used. By means of lantern slides, he showed how the real character of a suspected water could be ascertained—the presence of the blue tint indicating purity, and the red or orange furnishing unquestionable proof of pollution. The taste, odour, and temperature of water were next touched upon. Dr. Rideal emphasized the importance of water being fully aërated; deficiency of oxygen being a clear indication of bad quality. It should, he said, contain 7 cubic centimetres per litre; and he showed his own simple method for determining the quantity of dissolved oxygen in water. The value of rain water, the product of atmospheric distillation, as an auxiliary to the ordinary supply, was alluded to, and suggestions were offered in regard to its collection and storage. Dr. Rideal laid stress upon the point that it must be pure, and he showed how its impurities could be removed.

Coming to the secondary natural processes of purification, the lecturer explained that they comprised sedimentation in rivers and lakes, percolation through porous soils and rocks, and bacterial action setting up chemical changes of resolution and oxidation. Analyses were given which exhibited in a very striking manner the improvement or pollution of water due to its passage through soils; and the mode of action and the effects of percolation were fully described. With regard to surface water, in rivers and lakes, Dr. Rideal directed attention to the important part played by sedimentation in the purification of the water, cited examples of the great reduction in the number of bacteria occurring, and examined its causes. He remarked that English, Continental, and American results concur in showing that the water of even clean rivers is quite unfit, in a raw state, for drinking; and he said that after passing populous centres, though natural purification effects great improvement, a large number of bacteria, many of them pathogenic, are left, rendering further treatment necessary. With regard to the taking of flood water, he pointed out that three days' storage would remove from 70 to 90 per cent. of the suspended matter in water.

At this point, Dr. Rideal brought his discourse to a close; leaving for his next lecture (delivered last night) the subjects of the cleansing and control of weirs and dams, the protection of sources of supply, subsidence, storage, service reservoirs, and filtration of water.

Pure Thorium Salts Needed for Mantle Manufacture.—Dr. G. Drossbach, whose name is well known in connection with researches on the rare earths used for the production of incandescent gas-mantles, has lately shown that thorium nitrate which has appeared from the customary analytical methods to be almost pure and of uniform composition, but which yielded mantles of very different lighting power, has contained yttrium or metals of the yttrium group, which greatly affect the light afforded. He describes a method for the complete separation of the yttrium from the thorium. Thorium nitrate, which produced mantles giving a light of only 52⅓ candles, was so altered by his treatment for the removal of yttrium, that it afterwards produced mantles affording a light of 123 candles.

The Local Government Annual.—We have received a copy of the above-named work for the current year. It is the eleventh issue, and several additions have been made to the contents with the view of increasing its utility. The directory portion includes the names and addresses of the chief officials of all Corporations, London Borough Councils, County Councils, Boards of Guardians, Urban and Rural District Councils, County and Borough Asylums, &c., throughout the kingdom; and the names of the Committee Chairmen in the Metropolitan Boroughs, and the Chairmen and Vice-Chairmen of the London County Council Committees are given for the first time. Information is furnished in regard to the gas and water supply and electric light undertakings in the Metropolis; and we note that some necessary corrections have been made in the names of the officials of the former. The "Annual" is published at the office of the "Local Government Journal," Dorset Street, E.C.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by correspondents.*]

Profit-Sharing in Gas-Works.

SIR,—The moral of Mr. Burtonshaw's unfortunate experience is—pay as little as possible of the bonus in cash, which rarely does any permanent good to its recipients, and often does them harm.

I do not recommend simple profit-sharing, but use it as the best means of enabling the employees to become shareholders.

When thus worked, it both gives the workers an interest in the company and enables them to improve their position in life.

GEORGE LIVESEY.

Jan. 18, 1902.

The Clamond Stove.

SIR,—I had an opportunity, a few days since, of inspecting the Clamond stove, and I immediately recognized the burners as identical with those used in Dr. Adams's stove over twenty years ago. Dr. Adams's patent is No. 1095 of 1879; and any of your readers interested can easily refer to the specification, and verify my statement for themselves. The amusing part of the affair is that Dr. Adams does not, in 1879, claim the fire-clay burner as his patent, but refers to it as a burner known in chemical laboratories as the "Hofman" burner.

Now, in 1901, we have a resurrection of the "Hofman" in the glorified form of the "Clamond." So hard is it to find anything new under the sun.

A. P. MAIN.

Glasgow, Jan. 16, 1902.

[Dr. Adams's stove (which will probably by now have passed out of the minds of many of our readers) was described by him in a paper read before the Philosophical Society of Glasgow, which was reproduced in the "JOURNAL" for April 27, 1880, p. 634, and also in an article he contributed to the "JOURNAL" for May 4 of the same year, p. 671. The claims made on behalf of the stove were the subject of considerable controversy in our columns at the time.—ED. J.G.L.]

The Originators of Slot Installation Schemes Without Capital.

SIR,—In your issue of Nov. 19, it was stated that Messrs. John Wright and Co. were the originators of the above schemes. We are continually being asked who is the real originator; and, in view of the misapprehension which exists, we shall be glad to avail ourselves of your columns to point out that, while Messrs. John Wright and Co. were no doubt the first to introduce it to the profession, no manufacturer can claim the credit of conceiving this simple plan. It belongs to one of the first consulting engineers of our time.

About November, 1899, we were asked by this gentleman to still further develop our show-room and maintenance scheme, by providing slot installations in return for a payment on the gas consumed—on the lines of the electric companies' "free wiring." In October, 1900, at the Bristol Gas Exhibition, the Secretary of a South Wales Gas Company asked whether we were prepared to consider a scheme to divide the risk between the gas company and the manufacturer; and later on, he made some valuable suggestions as to short-date contracts, which we have now embodied in our agreements.

We delayed bringing our scheme to public notice pending the taking over of Messrs. George Glover and Co.'s meter business, and the completion of the necessary arrangements for its development, in order that our scheme might be presented in its complete form; and, though we have no wish to deprive the firm you mention of any credit to which they may be entitled in connection with first offering this new development, they certainly cannot make good the claim of having been the inventors of the scheme.

We venture to think the gas industry will be the better for another firm publishing a fresh scheme; and we welcome them in the forward movement to develop gas consumption.

In connection with the scheme itself, it may interest your readers to know how we have, in settling two recent contracts, dealt with three different classes of property which occur in many towns:—

1.—*Houses without gas.*—These are met by the original scheme.

2.—*Houses piped, but without fittings.*—These we have undertaken to fit up with brackets, pendants, and a cooker, and hand over same to the gas company at a shorter date, proportionate to the saving on the work already done.

3.—*Houses piped and supplied with fittings, but requiring only a cooker and fixing.*—Here again a still shorter period has been fixed in which we receive the agreed sum per 1000 cubic feet of gas consumed.

E. W. T. RICHMOND.

Queen Victoria Street, E.C., Jan. 18, 1902.

LEGAL INTELLIGENCE.

EDINBURGH SHERIFF COURT.—Friday, Jan. 17.

The Disastrous Gas Explosion in Edinburgh.

The record was closed to-day in two actions arising out of the disastrous gas explosion in Edinburgh on July 16 last. One of the actions is at the instance of Alexander Breck against Tod Bros., flour millers, Stockbridge Mills, Edinburgh, and William Stewart and Co., machinery merchants, Bonnington, Edinburgh, conjunctly or severally, for damages. The pursuer states that he was the tenant of the shop in Baker's Place, Stockbridge, of which Messrs. Tod were the owners. He remained in the tenancy until July 16 last, when he was dispossessed by a violent gas explosion which took place in the premises of the

defenders, which explosion wrecked the shop, damaged his goods, and rendered the premises incapable of being used for the purpose for which they were let. The explosion, he says, was caused by the fault of Messrs. Tod, or of those for whom they are responsible, or otherwise it was caused by the joint fault of Messrs. Tod and Messrs. Stewart. Pursuer explains that Messrs. Tod were making changes in the motive power of the machinery in their mill, which involved the removal of a gas-engine; that Messrs. Stewart, who were employed to do the work, proceeded to carry out the removal of the engine in such a reckless and careless manner that they permitted a large quantity of gas to escape, which caused the explosion that wrecked the pursuer's shop; and that Messrs. Tod failed to exercise a proper supervision over the work that was being done by Messrs. Stewart. In their defence, Messrs. Tod state that they had not asked the pursuer to pay rent since the premises had been unfit for occupation, and that the repairs are now nearly completed. They plead that the explosion, not having been caused by their fault, or any person for whom they are responsible, they should be assoilzied. Messrs. Stewart, in their defence, averred that the explosion was a pure accident, which could not have been foreseen or prevented, or that it was the consequence of some careless act on the part of others. A plea in the action having been taken by Messrs. Stewart, to the effect that the firm having been dissolved by the death of Mr. William Stewart, all parties had not been called, a supplementary action has been brought calling the Executors of deceased, along with the other defenders. The actions have been sent to the debate roll.

The Storage of Carbide of Calcium.

The Multitubular Co-operative Society, of Annan, purchased some carbide of calcium from Messrs. Millar and Sons, and an explosion took place on their premises. This led to inquiry; and in the Dumfries Sheriff Court last Wednesday, the Society and Messrs. Millar were brought up on a charge of contravening the Petroleum Act by keeping more than 5 lbs. of carbide on their premises without a licence. Messrs. Millar were fined £2 and the Society £1.

Theft from a Prepayment Meter.

A man named Taylor was last week charged at Gateshead with stealing 8s. 6d. from a prepayment gas-meter. It was stated that, in breaking the meter open to abstract the money, he had damaged it to the extent of 10s. The accused admitted his guilt, but said that he meant to put back the money on the following Saturday; the Gas Company's man, however, called before he could do so. A fine of 40s. was inflicted, with the alternative of one month's imprisonment.

Summary Dismissal for Neglect of Duty.

Mr. Job James, the Manager of the gas-works at the Royal Military College, Sandhurst, was summoned before the Wokingham County Bench, on the 7th inst., by a stoker named F. Rose, who sought, under the Employers and Workmen's Act, to recover 17s. 2d. wages for four nights' work, and 30s. in lieu of notice—he being a weekly servant. Plaintiff was summarily dismissed on Boxing Day; the reason assigned being that he had neglected his duty in not charging the retorts on Christmas Eve. Mr. James said that on the morning of Christmas Day he found it impossible to make gas, owing to the heat of the retorts having been let down; and he, together with his brother and another man, had to turn to and work all day. Evidence was given that defendant had frequently been found asleep while on duty. The Magistrates dismissed the summons, but made no order as to costs.

Swansea Water-Works Dispute.

On Monday of last week, the case of Paterson *v.* Swansea Corporation was mentioned before Mr. Justice Bucknill, sitting in the King's Bench Division. It will be remembered that in July last the Corporation agreed to pay £26,000 in settlement of the claim made against them by Messrs. John Paterson and Son, Limited, who were the Contractors for the new reservoir at Cray; the Corporation taking over the contract as well as the plant, material, &c., on the works. Messrs. Paterson now asked his Lordship to order the defendants to deliver up certain things which they said did not form part of what was agreed should be handed over to the Corporation. The property in question consisted of two quarries, a railway siding on the Neath and Brecon Railway, office and bungalow furniture, grazing stock, cement bags, and water-tubes. For the plaintiffs, it was argued that the things claimed were not "property now on the premises" within the meaning of the terms of compromise. His Lordship eventually held that everything in question—with the exception of a few little ponies, which belonged to Mr. Donald Paterson privately—was included in the agreement, and ordered plaintiffs to pay the costs of the application.

Ossett Gas-Works Transfer.—The last stage of the proceedings in regard to the transfer of the undertaking of the Ossett Gas Company to the Corporation has been reached by the publication of the award of the Umpire (Mr. Frederick Fowler) in the arbitration which was held to settle the amount payable to officials of the Company under the scheme. Mr. William Moys, the Manager, who claimed £1731 2s. 2d., is to receive £1300; and Mr. Walter Horsnell, the Secretary, who asked for £839, has been awarded £280.

Duffield and Derby Gas Amalgamation.—It was announced last month that negotiations were pending for the amalgamation of the Duffield and Derby Gas Companies; and now an extraordinary general meeting of the former Company has been held to consider the proposal made by the Derby Gas Company for the purchase of the undertaking as a going concern. It was resolved that the Company should be wound up voluntarily, and sold on the terms of the provisional agreement arrived at between the parties; Mr. T. H. Harrison being appointed Liquidator.

MISCELLANEOUS NEWS.

THE GAS QUESTION IN PARIS.

Reduction in Price—Gas Supply to be "Farmed" by a Company.

Readers of the "JOURNAL" who have followed the progress of the Gas Question in Paris may remember that, as the result of a debate in the Municipal Council just before the summer recess last year, a Special Committee, consisting of 45 members, was appointed to inquire into the general working of the Gas Company, study the questions of the municipal management or the "farming" of the undertaking at the expiration of the concession, and consider the position of the Company in regard to the outside districts. The Chairman of the Committee was M. Deville; and the Vice-Chairmen MM. Chassaigne-Goyon and Maurice Spronck. The Committee duly investigated the subjects entrusted to them; and towards the close of last year, M. Spronck presented to the Council a report in which the scheme formulated by M. Chamon and his colleagues for the solution of the problem was recommended for adoption. The main features of the scheme were given in the "JOURNAL" last week (p. 97). When the matter came before the Council, they were on the eve of the New Year; and it was obviously impossible to dispose of a question of such magnitude within the time specified in the instructions to the Committee—viz., Dec. 31, 1901. The Prefect of the Seine (M. de Selves) was, however, equal to the occasion, and he came to the rescue. He reminded the Council of the existence of the Technical Commission appointed a few months after the Committee, as recorded in our columns at the time, to consider and report upon the future management of the gas and electricity supply of the City, of which he was President; and he told them, in the blandest possible manner, that this body would have a word to say on the matter under consideration. He advised them to adjourn the debate till the 10th or 12th of January. This intervention on the part of the Prefect at the eleventh hour raised a storm of protestations; but, in the end, a motion to adjourn was carried by a very large majority. Thus the matter stood at the close of the past year.

The next step was taken by M. de Selves, who called a special meeting of the Council for the 9th inst. to deal with the gas question and some other important matters affecting the city. As mentioned in our editorial columns last week, that troublesome question was first considered. On the previous occasion, M. Spronck had addressed the Council in support of the conclusions and recommendations of his report; and, on the resumption of the debate, these were combated by three speakers in succession. M. Félix Roussel characterized the Chamon scheme as dangerous, costly for the City, and as establishing a practical continuation of the existing monopoly. At this point, M. Adrien Veber laid upon the table a counter-project, substituting the Municipality for M. Chamon and his colleagues as controllers of the gas undertaking—in other words, a project for municipalization. M. Landrin followed M. Roussel in the same strain. He attacked the proposal of the Committee as being nothing more than a speculation, with which the Municipality should not be associated. He called for the rejection of the scheme. M. Gelez suggested a short and simple way of settling the question. Without further parley, let them, he said, invite the Prefect of the Seine to take possession of the property on Jan. 1, 1906, and inform the Company that the Municipality had decided to use, if necessary, their right of requisition. The question would then settle itself. With the enunciation of this brilliant idea, the first sitting was brought to a close.

The second day's proceedings opened with a speech from M. Brard, a former workman of the Company, and one of their most violent adversaries. He opposed everything in the way of an understanding, unless the claims of the workmen and staff were considered as well as those of the consumers. He submitted a proposal according to which the price of gas would, as from the 1st of May, be fixed at 15c. per cubic metre (3s. 4½d. per 1000 cubic feet), and all discharged workmen would be reinstated. He protested against any of the present Directors being brought into the new combination. M. Achille spoke in favour of municipalization, which, to his mind, was the only honest and profitable way of working the concern for the benefit of the City. M. Poirier de Narçay was of the same opinion; and he proposed a resolution to the effect that, as from Jan. 1, 1906, the gas undertaking should be carried on by the Municipality; the price of gas to be lowered to 20c. per cubic metre as from the beginning of the present year, and the Company to receive 90,000,000 frs. indemnity. The next speaker was M. Sauton. As a member of the Council who for some years has made a study of the gas question, he was awaited with some impatience. He declared himself entirely in favour of the Committee's proposal, and of an immediate reduction in the price of gas. He pointed out that the cost of gas per cubic metre would be about the same, whether they adopted direct or indirect control of the undertaking, and expressed the opinion that the scheme submitted to them was an excellent one for the City, and much less favourable to the proposed farming Company than its opponents had contended. M. Caplain, who followed, said it appeared to him the scheme had emanated from the Company. With regard to the price of gas, he thought that, if it was continued at 30c., it could be brought down to 15c. as from the commencement of 1906.

At this point, several members whose names were down to speak declined to do so, giving as a reason that they had not had time to study the report of the Technical Commission referred to by the Prefect of the Seine, which had not reached them till the preceding evening. According to the "Temps," from which this account of the proceedings is taken, there was a veritable "strike" of orators. Some members of the Right called for the closure. But the Left protested against it, saying that it was not late, and that there was now an opportunity for discussing the reports of MM. Piault and Quentin on the question of the treatment of the staff, and the relations of the Company with the consumers. M. Spronck opposed this, on the ground that the matters referred to did not involve any question of principle, and could be very well dealt with in the discussion of the clauses of the

scheme. The Left persisted; but the Right and Centre held their ground firmly. Here a violent scene ensued—appeals to, and abuse of, members being fairly mixed up. At length the President put a motion submitted by M. Labusquière, calling upon MM. Piault and Quentin to bring forward their respective reports; but on being put it was lost by 40 votes to 38. An attempt was then made to go on with the general discussion; but no one seemed disposed to ascend the rostrum. The Prefect of the Seine was asked to speak. He, however, only said he would express his opinion on the question at such time, and under such conditions, as he should deem convenient. Thereupon the Right again called for the closure, and a tumultuous scene ensued. M. Piault could scarcely be heard as he read the documents setting forth his proposals; and when he had finished, as there appeared to be no desire to continue the discussion, it was adjourned till the following day.

The third day of the debate was a remarkable one—the sitting lasting from three o'clock in the afternoon till two the next morning without any decision being arrived at. The proceedings opened with a speech by M. Sauton in opposition to the counter-project of M. Adrien Veber. He concluded by moving that the Council proceed at once with the discussion of the clauses of the scheme presented by the Committee. Thereupon M. Veber renewed his attack upon the report of M. Spronck and upon the Committee and their work. He expressed his astonishment that they had not gone more fully into the question of municipalization, and cited Germany, Spain, Italy, Belgium, and England as countries where the principle had been most successfully adopted in connection with gas undertakings. He concluded by proposing that, in order to effect a reduction in the price of gas from 30c. to 20c. per cubic metre from Jan. 1, 1902, the Municipal Council should pay in cash a minimum sum of 222,000,000 frs.—100,000,000 frs. representing the share of the City in the assets falling to it at the end of the concession, and 122,000,000 frs. the minimum cost of the reduction of 10c. per cubic metre. It was eight o'clock when M. Veber concluded; and the sitting was suspended.

At half-past nine the Council re-assembled to hear M. Desplas, who reminded his colleagues that they had already decided to avoid everything tending to a renewal of the existing monopoly, and called upon them to persevere in the maintenance of this attitude. To his mind, the scheme before them would have the effect of creating for the new Company a position which the old one would not have hoped to obtain in 1870. He concluded by saying the Prefect of the Seine would shortly submit a fresh combination which would do justice to all the interests concerned, and permit of an immediate reduction in the price of gas, either by an arrangement with the existing Company, or by a direct payment out of the Municipal Exchequer. M. Desplas was followed by M. Deville, the Chairman of the Committee, who replied to all their opponents in a body. He condemned the idea of municipalization as being impracticable, and concluded by calling upon the Council to at once decide against it. This appeal was received with applause by the Right and the Centre, but it aroused a perfect tumult on the Left. MM. Veber, Labusquière, Rozier, and others, manifested a desire to reply to M. Deville on the question of direct municipal control. They explained, as well as the disturbance would allow, that proposals in this direction had been submitted, and ought to be examined. The Prefect of the Seine intimated that he was opposed to closing the discussion, as he was desirous of addressing the Council. He moved the adjournment of the debate till the next sitting. M. Deville pointed out that a vote could be taken at once on the question of the municipalization of the undertaking without closing the general discussion. Several councillors expressed the same opinion. They again brought forward the proposal of M Poirier for direct municipal control as from Jan. 1, 1906, and then demanded a ballot thereon. The Left protested energetically, but in vain. The boxes were brought in, and, amid indescribable uproar, the vote was taken. By general agreement, the Left held themselves aloof; and the opponents of municipalization to the number of 39 recorded their votes. In the midst of the general confusion which ensued, the sitting was brought to a close, and the further consideration of the subject was adjourned till Tuesday—the special assembly of the Council, originally fixed for four days, having been extended by the Prefect of the Seine till the 18th inst.

It might have been supposed that the vote recorded against municipalization at the close of the third day's proceedings would have put an end to the general discussion; but this was not the case. On re-assembling on Tuesday afternoon, after a few remarks from M. Poirier, the Council were addressed by M. John Labusquière and the Prefect of the Seine. The former stated that he had agreed with his constituents not to vote for any reduction in price on the conditions laid down by M. Spronck. He said he was very desirous of putting an end to an odious monopoly, but without pledging the future. The scheme before them was, in his opinion, simply a prolongation of the old monopoly, for the proposed farming Company emanated directly from the existing one. He concluded by condemning the Chamon scheme as nothing more than a scandalous financial operation, and declared his intention of not recording his vote in favour of it. The Prefect of the Seine followed with a telling speech. He began by expressing his opinion that the new majority of the Council had made a very great mistake in hastily rejecting the proposal for the direct control of the gas undertaking. He explained that he was by no means an enthusiastic admirer of municipal management; but at the same time a proposal to adopt it ought not, in his opinion, to be rejected without due consideration—merely as a foregone conclusion. With these few words of explanation, he proceeded to examine the scheme submitted by the Committee. This he did in all its details, and demolished it, so far as it could be done in courteous and unstudied phraseology. He said the subject of reducing the price of gas had been brought up at the time of the municipal elections in such a way as to create a false impression in regard to it. There were two distinct questions involved; and they must be kept distinct. It would have been far preferable not to have introduced the subject of reducing the price, and to have devoted to the acquisition of the Company's half of the property the 100,000,000 frs. which the alteration in the charge would cost. But since the question of price had been raised, it was advisable to dispose of it separately, by adopting the proposition brought forward by M. Desplas—viz., to reimburse the consumers or the Company the difference of 10c. per cubic metre in the price of gas. This matter disposed of, the Council would have been free to proceed with the settlement of the future control of the undertaking. What would be the nature of that control? He declined to believe it would be that favoured by the Committee. Having criticized the report of M. Spronck—emphasizing and amplifying arguments which had been advanced by M. Desplas in regard to the too extended period of the concession, the large amount of capital, and so forth—he closed this portion of his speech by declaring himself entirely opposed to the Chamon scheme. At the same time, as he was desirous of bringing this matter to an end, and as the Council did not appear to be averse from treating with the existing Company, he would himself propose a fresh combination.

M. de Selves then proceeded to give details of his scheme. He said the Company made out that their half of the works and plant was worth 100,000,000 frs. On the other hand, it was agreed that this sum would be required to bring down the price of gas 10c. from now till the beginning of 1906. The City would relinquish her share of the assets (equivalent in value to the Company's), and, in return, the latter would lower the price to 20c. per cubic metre. For a period of 20 years from 1906, the Company would furnish a supply of gas, paying a rent-charge of 6·5c. per cubic metre (about 1s. 6d. per 1000 feet), *plus* 1,000,000 frs. per annum for the use of the distributing plant, which would then belong to the City. In addition, the Company would guarantee the pensions of their employees, and pay over to them a proportionate share of the profits. As a set-off for these concessions, the Company would be authorized to contract a loan of 120,000,000 frs., of which 100,000,000 frs. would go in compensation for the share of the assets for which they would not receive payment in cash, and 20,000,000 frs. for the extension of the works at Le Landy. This combination, said the Prefect, was favourable to the shareholders, as under it the gross receipts would be 71,000,000 frs., while the expenses would be only 31,800,000 frs.—leaving a profit of 39,200,000 frs. The City would take 22,730,000 frs. and the Company 15,520,000 frs., of which 8,730,000 frs. would be required to pay the interest on the loan. The difference would go to remunerate the holders of shares paid off, yet still entitled to dividend, to whom 30 frs. per share could be allowed. No project could, he thought, be more favourable to the shareholders, while it would safeguard the finances of the City, who would have absolutely nothing to disburse. Moreover, the future was not pledged for more than twenty years, instead of fifty, as proposed by the Committee; and no legislative formalities would be necessary to carry out the arrangement. In conclusion, M. de Selves invited the Council to study his proposal, and to reject the Chamon scheme, which, to his mind, was the worst solution of the gas question, so far as the City was concerned, which had been proposed. The Prefect's speech was listened to in silence; but at its close there was a general expression of surprise at his proposal to reopen negotiations with the Company. The members were so astounded that no one showed a desire to reply. It being seven o'clock, the President (M. Dausset) suspended the sitting.

The proceedings were resumed at nine o'clock, when there was a full attendance. The debate was opened by M. Sauton, who, as the champion of the Chamon scheme, violently attacked the latest project of the Prefect, which he pronounced altogether unsuitable for Paris. He again spoke in praise of the Chamon scheme, which he said the Council did not understand, and advised its adoption. Thereupon M. Pierre Morel declared such a course impossible, as Paris would be ruined. M. Julien Caron submitted a motion to take a poll of the citizens on the question. The Nationalists protested against this, and the usual disturbance took place. The two parties in the Council massed themselves right and left of the platform, and there were loud cries of "Vote." The President beat upon his desk with the view of restoring order, and after a quarter of an hour's exertions succeeded in doing so. Addressing the Council, he called upon them to vote on the motion of M. Sauton to close the discussion, and proceed with the consideration of clauses. This was done, with the following result: For the motion, 40; against it, 37—majority, 3. On a second count, the numbers were 41 to 36, or a majority of 5. It was then decided to commence the discussion of the clauses, of which there were more than 200, at three o'clock next day; and, it being midnight, the sitting was brought to a close.

On the re-assembling of the Council on Wednesday afternoon, the clauses were taken *seriatim*. Some were passed at once; others were reserved. Whenever voting took place, the numbers were generally 40 against 38. The clauses relating to the reduction in price from 30c. to 20c. per cubic metre from Jan. 1, 1902 (the 25th and following) were agreed to. The Council had reached clause 32 by half-past seven, when the sitting was suspended. Further progress was made later in the day. On Friday there was a stormy debate in the afternoon, followed, with the usual interval, by a night sitting equally turbulent. On clause 83—specifying that the gas was to be made from coal, but might be enriched with the bye-products of distillation—which was finally discussed about half-past two in he morning, M. Spronck explained that he had modified the wording so as to prohibit the supply of water gas without the authority of the Prefect of the Seine or the Municipal Council. Dr. Navarre contended that on no account should water gas be allowed; but, as far as we can gather, he did not carry his colleagues with him. The proceedings were continued till ten minutes past six, when the last vote was taken. The Chamon scheme was adopted by 41 votes—the whole of the Left abstaining from taking part in the final act. So far as the Municipality could secure it, therefore, the Parisians will henceforth pay only 20c. per cubic metre for their gas. The decision come to, after so much discussion, can, however, be annulled by the Government with the sanction of the Legislature.

Windsor Water Supply.—The profit on the year's working on the revenue account of the water-works of the Windsor Corporation increased from £5518 for 1899-1900, to £5585 for 1900-1901—an increase of £67. The total receipts were £8282, and the expenditure was £2696. The balance of interest on debenture stock has substantially decreased; and it is expected that in a few years the works will be self-paying, and that the borough fund will be no longer taxed for the payment of interest on the debentures.

THE WELSBACH CRISIS.

The Advisory Committee Victorious—Future Friendly Relations with the Gas Industry.

The investors of capital in the Welsbach Company have had many meetings which have been remarkable from one cause or another; but the one which was held in the Grand Hall of the Cannon Street Hotel last Wednesday will be the most memorable of all. It was called an extraordinary general meeting; and it was extraordinary in more respects than the usual meaning applied to the term. The hall was packed to its utmost limits; and even the galleries were brought into use to accommodate shareholders. Yet the whole body to within a dozen, were favourable, at the end of the discussion, to the adoption in their entirety of the Advisory Committee's recommendations. Was ever a more pronounced condemnatory judgment passed on the administration of a concern? New charges of maladministration were levelled against the Directors, the truth of which was vouched for by all the Committee from the Hon. Philip Stanhope downwards.

The Chairman of the Committee, supported by the whole of his colleagues, was the first to enter the hall just before noon; and their reception at once indicated the shareholders' appraisal of their work. Shortly afterwards, Sir Henry Burdett, accompanied by his faithful colleagues and officials entered; and at this stage there was a decided divided demonstration both for and against them. At the close of the meeting, they departed without thanks and without a cheering voice. On their entry, their faces and demeanour declared a full appreciation of the seriousness of the occasion and of the tottery position in which they stood in the estimation of the shareholders. Sir Henry Burdett, of course, occupied the chair. Quite three hours were expended in the discussion, which was practically confined to the Board and the Advisory Committee. Over that discussion, we only intend to pass lightly—merely dealing with the points in which "JOURNAL" readers are most concerned. Naturally on such an occasion there was much excitement.

THE DIRECTORS' COMPLAINT.

The proceedings were opened by Sir Henry, who first charged the Committee with breach of faith in not having submitted their report, in the first instance, to the Board before submitting it to the shareholders. He asserted that, unless it had been clearly understood that the document was to be first presented to the Board, they would never have consented to the election of the Committee. This was a bad admission, as it simply drew uproarious laughter and the comment "rubbish." He next accused the Committee of having paralyzed the Company's business by spreading broadcast the impression among the trade that, if their report was adopted, the price of the burners and mantles would be immediately reduced. In expectation of this, the trade had ceased to stock the Company's goods. For confirmation, he read a letter from one of the Company's largest customers in Birmingham. The effect, he declared, had been to suspend orders, and to largely reduce sales, in what promised to be one of the most prosperous years in the Company's history. The Chairman next directed attention to the Committee's report. He had, he stated, a complete answer to the first 49 paragraphs of the report, so far as they impugned the Board or their policy. Much of it, however, was debatable matter, much was wrong, and much, he went so far as to say, was introduced for mere prejudice. For these reasons, he did not propose to enter into them, unless challenged by the Committee.

POINTS OF DIFFERENCE.

Passing on, Sir Henry only found four points on which the Board were at issue with the Committee. The first had reference to the proposed reduction of the capital; but, on this point, it is sufficient to say that Sir Henry emphatically stated that, so long as he was Chairman, neither he nor his colleagues would ever countenance any proposal to tamper with the capital, as any such proposal would be utterly opposed not only to the just rights of the preference shareholders, but to every class of shareholders represented by the capital. As to the recommendation of the Committee that the Kern burner and the Chalmers anti-vibrator enterprises should be realized by sale, he thought the shareholders were entitled to the Committee's authority for saying that the money spent in their purchase had been wastefully applied. The Directors considered these were assets of great prospective value, and that they should be retained and developed. A large undertaking like theirs must rest upon a policy which recognized that, when patents had expired, the public would patronize those who, like the Welsbach Company, supplied the best burners and mantles which could be produced from time to time, as science advanced and improvements were introduced. The policy of the Board had been to acquire and develop new sources of revenue; and it was in pursuance of this policy that the Board acquired the Kern burner. This burner had been misrepresented and misunderstood. To it, in conjunction with Chalmers' anti-vibrator, the Company owed their commanding position everywhere in street lighting. Attempts had been made to introduce other anti-vibrators; but the Chalmers patent was so well drawn and so good that it had been found impossible to get round it. These patents held the field, and gave the Company the practical monopoly of street lighting; yet the Advisory Committee informed the shareholders that the exclusive acquirement of these patent rights had been entered into without due investigation on the part of the Board. It must be apparent to the shareholders, as men of business, that, if these patents had not been acquired, a strong opposition Company would have been floated, with adequate resources; and, with a new burner, mantle, and heater, it would have played havoc with the Company's business, and probably have ruined them. Having spoken of the development of the Kern burner business in France, he turned to the question of the suggested

CLOSER ASSOCIATION WITH GAS COMPANIES.

The Board, he asserted, had always been in favour of co-operation with gas companies; but association such as the Committee suggested was another matter. The Directors considered such association would be fatal to the Company. He reiterated the views of the Board on the subject, as presented by them in their reply to the Committee's report; adding that such association would alienate the entire gas trade, upon whose good will the Company were dependent for 85 per cent. of their present business. The Chairman called attention to an affidavit by Mr. George Livesey (for whom he said he had the highest admiration) in favour of a competitor of the Company, in which it was declared—and this showed a strong hostility to the interests of the Company—that reasonable facilities should be given to the obtaining of Welsbach mantles, without any difficulty, at a cost of about 3d. per mantle, which would, Mr. Livesey said, allow ample profit to the manufacturer. Just imagine, said Sir Henry—having regard to the initial cost of a mantle of the best type, which was the only class of mantle the Welsbach Company could, with due regard to the maintenance of their business, afford to give—what sort of profit would be left for the shareholders when they listed the best mantles at 3d. Yet the Committee in the same breath recommended closer association with the large gas companies and a revision of the present selling arrangements, presumably in accordance with the requirements of Mr. Livesey and other gas representatives. When the present season ended, the Board were in favour of a further reduction in price, upon terms which would yield to the shareholders an adequate profit and an extended business. As to the

REMOVAL OF THE BOARD,

the shareholders would desire to hear from Mr. Stanhope the names of the gentlemen whom the Committee proposed should take their places. The Directors were not there to ask for mercy or consideration. Whatever might be the shareholders' opinions as to the policy on which the Company had been worked in the past, he would ask them to remember that it had resulted at any rate in a steady increase in the sales; and that the profits of the English business, as shown by the accounts to Sept. 30 last, exhibited a great improvement. The Committee had not said, and he challenged anyone to say, that the slightest imputation could be produced against the integrity of the Board's management. Sir Henry ended by moving the rejection of the recommendations of the Advisory Committee so far as they were inconsistent with the policy of the Board, as set forth in their circular issued on the 3rd inst.

The motion was seconded by Mr. James Head, from whom the shareholders heard nothing new, excepting a condemnation of the proposed alliance with the "sworn foes" of the Company—meaning, presumably, the large gas companies.

THE ADVISORY COMMITTEE'S CASE.

Then came the turn of the Hon. Philip Stanhope; and he received quite an ovation on rising. He repudiated any suggestion that the Committee was a creation of the Board, and proved his point. He declared that all along the Committee had recognized their absolute independence, and stoutly asserted that they never agreed that their report should be first submitted to the Directors. It would have been the height of absurdity for the Committee, who struck at the very root of the difficulty in this matter, by suggesting the removal of the Board, to appeal to that very Board as to what they should say. In his remarks, the Chairman had confined himself to saying that, with regard to the first 49 paragraphs of the report, they could be dealt with if necessary. He (Mr. Stanhope) presumed by this that the report so far was considered sufficiently satisfactory to the average intelligence not to require further explanation. He did not think it could be suggested for a moment that the Company was not immensely over-capitalized. The responsibility for this was in the first instance that of the promoters; but they could not dissociate the Chairman from a share in it. Sir Henry had told them that the capital was settled before he took his seat as Chairman; and therefore he could not do anything more than accept the situation. There was, he said amid cheers,

ANOTHER THING SIR HENRY MIGHT HAVE DONE,

and that was to refuse the chair. If he had done so, he would have saved an immense loss to an enormous number of unfortunate and unsuspecting shareholders. Mr. Stanhope went on to point out that, while the Committee said the capital ought to be reduced, they made no positive recommendations on the subject; they merely said it was a matter requiring urgent consideration. However, he emphatically declared that the Committee were not prepared to withdraw one syllable of the report in regard to the reduction of the capital. The Committee had been accused by the Directors of hampering the work of the Board. He only regretted they could not have hampered it a little more—particularly in connection with

CERTAIN ACTIONS OF THE BOARD.

He referred to the transference of the Board's banking account from one bank to another, and to the negotiation of a loan in the City. The Directors agreed to give a commission of 3 per cent. for obtaining a loan of £40,000, to be repaid by May 31. For this a debenture was to be given at ½ per cent. discount, and redeemed at par when the loan was paid off—that was to say, 1 per cent., and an interest of 5 per cent. The loan was made on terms varying, according to the time the money was taken up, between 10 and 12 per cent. per annum. He asked whether the shareholders could say that this was the act of a good, efficient, and prudent Board of men. The Committee addressed a firm of bankers on the subject, and found that they would have been willing to have advanced a loan at ½ per cent. above Bank rate. Then Mr. Stanhope criticized severely the action of the Board in entering into a contract in November last with a German firm to supply 20 million mantle cottons at 46s. 8d. per 1000, which price was 12s. 2d. higher than the quotation of an English firm, and represented a dead loss to the Company of £12,000. These revelations aroused the wrath of the shareholders, which was not softened by the statement of Mr. Stanhope that the orders for the season were not usually given out until March, and that it struck the Committee as being rather peculiar that there should have been such hurry this time. He therefore thought the shareholders would agree with him that it would have been well if the Committee could have hampered the Directors a little more. As to the Company's interests in some other enterprises,

whatever might be the future value of the Kern Burner Company, it was at present merely a sucking calf of the Welsbach Company. It had had £15,000 in cash against debentures, £7000 on current account, and they had Mr. Moeller's authority for saying that £20,000 more capital would be required out of the Welsbach Company. He (Mr. Stanhope) could hardly call this a new source of revenue. The Directors had strangely neglected the question of the poor Sunlight purchase; but he might say that, if the Welsbach Company were going to buy up all their competitors, they would have a tough job indeed. The purchase of the Sunlight Company was not justified; and it represented no value whatever. As to the proposed policy of

CLOSER ASSOCIATION WITH GAS COMPANIES,

he asked the shareholders whether they had taken into their minds this fact: That at the outside only 15 per cent. of the users of gas in this country employed incandescent mantles, whereas in other countries, he thought he was right in saying, the proportion varied from 80 to 90 per cent. This was due to the fact that the gas companies in this country had not yet thoroughly entered into the field of incandescent lighting. They had shown a very conservative policy in regard to incandescent gas lighting. But now there was a change in their attitude; and the Committee saw here the prospect of an enormous custom being derived. Were the Company then to shut their doors upon the gas companies, and say "No, gentlemen, we cannot deal with you, because we deal through the ordinary traders?" The Company could do both classes of business. The future of the Company depended entirely upon the popular development of the mantle. As to the

FUTURE MANAGEMENT,

he spoke of the regret with which the Committee had felt it their duty to suggest that the present Board were unworthy of their confidence. It was, he emphatically said, essential that they should have an absolutely new and absolutely modern administration of the Company's affairs. Not one of the members of the Committee aspired to become a member of the new Board; but what they proposed was the selection of a Board of really experienced business men, with one representative of the gas interests. They had received from Mr. Peters, the late General Manager, an offer (which they had been glad to accept if the shareholders so desired) to join the Committee as an extra member, in order to assist them in their future work. While the Committee were not prepared to become permanent members of the Board, they were willing, in the interests of the shareholders, to take over temporarily, with the assistance of Mr. Peters, the administration of the Company's affairs. He moved that the report of the Committee be adopted in its entirety; that the present Board be requested to facilitate giving effect to the recommendations of the Committee, particularly by resigning forthwith; and that the Committee, with Mr. Peters, be elected in their place as a provisional Board to carry on the affairs of the Company until the services of a definite Board were secured. The lengthy speech of Mr. Stanhope was punctuated throughout by marks of approval.

Then there was great uproar when the Chairman again rose, the purpose of his doing so evidently being divined by the shareholders. When he could obtain a hearing, he appealed for fair play, reminding those present that he was still their Chairman, though it might be the last time he would occupy the position. He then stated that he was advised that the second part of the resolution proposed by Mr. Stanhope could not be accepted; and he ruled it out of order.

It was explained by Mr. Stanhope, and he confirmed it by reading the correspondence, that the Board had been made aware of the Committee's intentions. He then simply moved that the report of the Committee be received in its entirety.

The next speaker was Mr. T. G. Barratt (a member of the Committee). He said Sir Henry Burdett had suggested that the Committee had some association with the promoters; and this he characterized as ungenerous and untrue. With regard to the £39,000 spent in litigation, Sir Henry had stated that it only represented an expenditure of ½ per cent. as an insurance of the capital. He (Mr. Barratt) was glad to know this, because if ½ per cent. had been spent on the insurance of the capital, then someone had to restore to the shareholders £2,800,000. He agreed with his coadjutors that the practical portion of the business which the future Board of the Company had before them was to deal with it

PURELY ON COMMERCIAL AND NOT LEGAL LINES.

They had spent three years of their life already in endeavouring to show their title to the 1893 patent; and unfortunately to-day they were not much nearer to showing this than they were three years ago. What they wanted in the future was the assistance of every gas-fitter, plumber, and retailer, *plus* the assistance of the gas companies. He showed that the "trade" had been liberally treated. He also pointed out that the Company's present patent had only six more years to run; and this brought the remark from Mr. Fonblanque that there were other patents which would supplement that. But Mr. Barratt was not shaken from the course of his argument; and he plainly told the shareholders that what they had to do was to prepare themselves so that, when the time arrived, the Company could hold the market independent of patents altogether.

The next speaker representing the Committee was Mr. E. Williamson, who spoke in such a fearless way, and sharpened his points with such vigour, that the shareholders were sorry, notwithstanding a previous disposition to drastically bring the proceedings to a conclusion, when he had finished—in fact, he put fresh animation into the meeting. He admitted that it might have been the case at the beginning of the inquiry that the Committee had had no practical knowledge of the gas industry, but they had something which had been of value to the proprietors, and that was practical common sense. He also alleged that the time of the inquiry might have been much shortened had it not been for the misleading statements and misstatements made to the Committee in the course of the inquiry. He forcibly protested against these

"ENDEAVOURS TO HOODWINK THE COMMITTEE,"

in the hope that they might mislead the shareholders. For example, when inquiring into the Kern Burner Company's matter, the Chairman stated that he had had prepared a trial balance-sheet and profit and loss account; and he showed from it that up to date the cost to the Welsbach Company of the Kern Burner Company was £479. But, by a very simple addition, the Committee found the cost up to date was over £21,000. Mr. Williamson also alleged a misstatement in connection with the Company's banking arrangements, which led to a stormy scene. The Chairman rose to make an explanation, the shareholders would not hear him, and both gentlemen for several minutes remained standing. Eventually, Sir Henry adopted the sensible course, and resumed his seat. Another misleading statement, Mr. Williamson asserted, was made by the Chairman in connection with the purchase of the Kern burner patents. Sir Henry told the Committee he was under an obligation to complete the purchase at the date of the Company's incorporation; while the Directors in their reply said that all the Chairman pointed out, for the information of the Committee, was that a contract was in progress of negotiation. There was all the difference between negotiation and an actual contract. He then commented at length on the onerous terms upon which the Kern burner and the Chalmers anti-vibrator patents were acquired, and said that, in the Committee's opinion, there was no justification for the expenditure of £80,000 in cash of the working capital of the Company in the first year of its existence on the acquisition of an untried and unproved patent. It ought to have been possible for the Company to acquire these patents for, if any cash payment at all, only a small one. They were told they had acquired a new burner, a new mantle, and a new heater; but what they had not got was revenue. If they added to the cost for the Kern British patents, the sum expended to work them, the £21,000 spent on the Kern foreign patents, the contingent liability of £3000, so much of the cost of the Sunlight purchase as the shareholders considered applicable to the Kern burner, and the loss on the Chalmers patent up to date, they had an appalling figure. He ridiculed the Company's method of distribution, pointing out that they sold in the first instance to the wholesale agent, who sold in turn to the retailer; and then in support of the trade about which they heard so much, the Company opened a shop side by side with a retailer. The Committee recommended that these branches should be dispensed with, and the competition stopped. He inquired, in conclusion, whether the shareholders would range themselves on the side of practical common sense, or what had been described as "rollicking egotistical incompetence." In a few remarks, Mr. William Whiteley stated that the Committee would have been justified in using stronger language than they had done.

The succeeding two members of the Committee had little to add to what their colleagues had already stated. Major-General Russell made an emphatic denial of the charge which, by imputation, had been brought against the Committee, of breach of faith in not sending their report to the Board before circulating it among the shareholders. Was it, he asked, conceivable that the Board would accept this report of the Committee, and was it not the most prudent and straightforward course to forward it direct to the shareholders? A decisive affirmative response came from the shareholders. The Committee, he also stated, entered upon their onerous duties with a most friendly feeling towards the Board; and they had no idea or conception until they had gone a long way in their investigation that it would be

THEIR PAINFUL DUTY

to recommend the Directors to resign. A point was made by Mr. George A. Touch (the next speaker) when he said that it would strike the shareholder as a somewhat remarkable thing that this Committee of six men, with divergent interests, with a varied training, and with varied experience should have come unhesitatingly, and with absolute unanimity, to the conclusion that one thing at least was essential in connection with the affairs of the Welsbach Company, and that was that there should be a complete change in the control of the Company. The Company had been in existence for a period of four years; and during the whole of those years, it had been steadily progressing along the road to ruin. During that time, there had been an enormous shrinkage in the capital value of their securities. As to the closer association with gas companies, Mr. Fonblanque had expressed himself most emphatically in favour of a closer alliance with the gas companies. In his (Mr. Touch's) opinion, the mantle had sold itself in spite of the bad management of the Company.

EXPLANATIONS BY THE CHAIRMAN

followed. In regard to the loan which had been referred to, he mentioned that the Directors did approach the bank on the subject of accommodation; but the security required was such that the Company's Solicitors questioned the propriety of acceeding to the terms. The Company thereupon considered it essential, in the interests of the business, to change the bank. This was in July last, when the credit of the Company had been reduced to such a low ebb that the Board ascertained that five of the great joint-stock banks declined to entertain the account; and it became necessary, in order to effect a change, to obtain a guarantee of the necessary loan required for the purposes of the winter trade. In the result, the Board agreed to pay a commission of 3 per cent. for the guarantee of the loan by the bank by Mr. Vaile; the money to be at call from Oct. 1, 1901, and to carry interest only on the amount outstanding from time to time—the interest being 5 per cent. There was great interruption at this point, and continuous cries of "Vote." Proceeding, the Chairman dealt with the assertion that £12,000 might have been saved the Company by buying mantle cottons from the English Sewing Cotton Company. But they had had no practical experience of the mantle fabrics made by that Company; and to this the pertinent inquiries were put, "Why not?" and "Where are your experts?" To neither of these questions did Sir Henry reply; but he did say that the Welsbach Company had always been unfortunate when they had gone outside the Coblenz mantle. As to the number contracted for, Mr. Mackean, the Company's Chemist, had reported that in the present twelve months, they would have used between 12 and 13 million mantles, and at least 13 millions would be required for next season. The new factory at Wandsworth was capable of turning out 20 million mantles per annum; and in the next year or two, he hoped to see the works fully employed. They had also obtained the option to acquire the patents for a number of new machines for the making of

double-twill mantles, which it was believed would be the best mantles ever put on the market. Regarding litigation, he understood the Advisory Committee were against it altogether; but Mr. Stanhope immediately undeceived him. At great length, Sir Henry dealt with purely personal matters—declaring, in regard to Mr. Williamson's charges, that of them he was as innocent as any man in the room; and he asked what earthly purpose could he have had in deceiving the Committee? He put the charges down to misunderstandings. Mr. Stanhope (intervening) stated that the Committee entirely endorsed what Mr. Williamson had said with reference to what happened before the Committee regarding the Kern burner patents.

The shareholders by this time had had enough; and when Colonel Munday essayed to speak as an "independent" shareholder, the noise was so great that nothing of what he had to say could be heard; and his gesticulations were the only interesting part of his endeavour. An amendment adjourning the meeting to June 30, to enable a conference between the Committee and the Board, was subsequently proposed by Mr. A. A. Knight, and seconded by Colonel Munday.

PRACTICAL EXPERIENCE OF THE MANAGEMENT

was given by Mr. Green, an ironmonger and a large provincial gas shareholder. He stated that he had found it absolutely impossible in the past to do business with the management of the Company. Meetings of the trade had been held for the purpose of absolutely boycotting the Welsbach mantle. He also spoke of what the Tunbridge Wells Gas Company were doing in the matter of maintaining incandescent lights, to disprove Sir Henry Burdett's point as to the hostility of gas companies.

THE RESULT.

The amendment by Mr. Knight was put to the meeting and rejected; and then the motion of the Advisory Committee was submitted. For this practically the whole of the meeting voted; and then, when "on the contrary" was put, only about a dozen isolated hands were raised. The motion was afterwards put as the substantive resolution, and carried. This was certainly a more sweeping defeat than the most sanguine of the Committee's supporters could have expected.

Sir Henry Burdett having declared the business at an end, Mr. Stanhope asked whether the Board would state if they were prepared to resign. There was no response; and Mr. Stanhope announced that the Committee would be obliged to send a requisition to the Board to call an extraordinary meeting, in order to ask for their resignation, and to elect a new Board. To do this, 10 per cent. of the capital of the Company would have to be represented on the requisition; and for this purpose the necessary papers would be sent to the shareholders.

The Directors then left the hall; and a hearty cheer having been raised for the Advisory Committee, one of the most remarkable of of Welsbach meetings came to an end.

SWINDON UNITED GAS BILL.

At the Meeting of the Swindon Town Council last Tuesday, the Bill being promoted for the amalgamation of the New Swindon Gas Company and the Swindon Gas and Coke Company, by the purchase of the latter undertaking by the former Company, was under discussion; and the Corporation decided that the measure should be amended in several respects. In the first place, they desire to include a provision that, in the event of the extension of the borough, which is highly probable in the near future, the maximum price of gas fixed by the Bill shall apply to such added area so soon as it becomes part of the borough. Next, they wish to insert a clause giving the Corporation similar powers for the laying of electric mains in private streets as the Company are seeking for the laying of gas-mains. The third alteration involves the insertion of a clause similar to section 70 of the New Swindon Gas Act, 1893, granting the Corporation the option of purchase, on terms to be agreed upon, within seven years of the passing of the Act. The Town Clerk was instructed to communicate with the Solicitors for the Bill, with the view of securing its alteration by the insertion of the proposed clauses.

MR. DUFF'S COMPENSATION CLAIM.

Arbitration at the Surveyors' Institution.

In November last, we announced (p. 1333) that, under the Morecambe Gas Act of 1900, Mr. William Duff, who would be relinquishing the management of the gas-works at the end of the year, was entitled to compensation for loss of office. He accordingly lodged a claim amounting to £5993; and, acting on the advice of Mr. Thomas Newbigging, the Council made an offer in settlement. Mr. Duff made a counter-offer, which was refused; and, under these circumstances, the services of Mr. Shiress Will, K.C., were called in as Sole Arbitrator between the parties. The proceedings took place last week at the Surveyors' Institution, Westminster; and after a very full hearing (which extended over three days), the Arbitrator reserved his award. The matter is, however, purely a personal one; and most of the points raised are such that they could be applicable only in this particular case. Mr. Duff (who spent 34 years in the service of the Company) was, in 1898, receiving a salary of £275 per annum, with house, coal, and gas; and a commission was paid him on all engineering work he carried out. In 1899, his salary was increased to £400 a year, but the commission was to cease. This increase was made much of by the Counsel engaged—one side contending that it was granted in consequence of extra work; and the other, that it took place owing to the suggested purchase of the gas undertaking by the Local Authority. The house, gas, coal, &c., was valued at £100 a year—thus bringing Mr. Duff's income up to £500. This, it was contended, should be commuted on the Civil Service basis, without the limitation there existing that the allowance should not exceed two-thirds of the salary. The Council did not, however, see why the Government rule should be adopted in part only. The basis argued upon by them was: Salary, £275; and house, &c., £67. This made a total of £342, two-thirds of which amounted to £228; and the capital required to commute this was £2150. This, they said, was the utmost sum Mr. Duff could be entitled to; but they also sought to bring into consideration, as a set-off, the £2000 presented to him by the Directors on the winding up of the Company—thus leaving only a lump sum of £150 to be awarded. It will be seen from this that the Arbitrator has several highly contentious points to consider in coming to a decision—and points on which there can be but little in the way of precedent to guide him.

BURNERS FOR REDUCED ILLUMINATING POWER.

Reference has already been made in the "JOURNAL" to the action of the Public Control Committee of the London County Council with the view of securing to the consumers of gas in South London the benefits of the provisions in the South Metropolitan Gas Company's Act of 1900, under which a supply of burners suitable for the consumption of gas of the lower illuminating power therein prescribed was to be furnished free of charge within two years from July 1, 1901. The Company informed the Council a few weeks before that date that they were prepared to begin providing the burners at once. Reports having reached the Council that the Company have supplied, on the application of consumers, two burners, which are described in a report of the Committee which stands on the *agenda* for the meeting of the Council to-day as "a governed burner which regulates the supply of gas on the most approved modern principles, and prevents undue consumption when the pressure is increased, and a stuffed burner (*i.e.*, stuffed with a plug of cotton wool between two pieces of fine copper gauze) which very imperfectly checks the increased consumption at high pressures." The Committee offer the following remarks on the subject: "The increased consumption of gas, even at ordinary pressures, by the second or stuffed burner is not inconsiderable; and in districts where the pressure is higher, owing to greater altitude, its use would lead to considerably increased consumption, unless the supply of gas to the burner was checked by turning down the tap. With the governed burner, a uniform consumption and illumination is obtained automatically, without any need for supervision or control on the part of the consumer. It is very desirable that consumers should have one or other of the new burners, and preferably the governed burner, for the reasons already given, as both these burners give about 20 per cent. more light for the quantity of gas consumed than the old burners which are still in common use." The Committee have sent a communication to the Press on the facts of the case, and propose forwarding a copy of the report to the Metropolitan Borough Councils of the districts supplied by the Company.

GAS TOPICS AT BRADFORD.

At the Meeting of the Bradford City Council last Tuesday—the MAYOR (Mr. W. C. Lupton) in the chair—two questions of interest as affecting the finances of the Gas Department were under discussion.

The adoption of the minutes of the Gas Committee having been moved and seconded,

Mr. JOHNSON asked whether, in view of the great fall that had taken place in the price of coal, the charge for gas could not be reduced as from the 1st inst.

Mr. JAMES FREEMAN (the Chairman of the Gas Committee) said that there was very little prospect at present of this being done. Though there had been a fall of from 3s. to 3s. 6d. per ton in the cost of coal, the saving for the year would only amount to £4600, because a great quantity had been delivered under the 1899 contracts. On the sale of coke, there had been a loss of about £8000, due mainly to the scare by the cases of arsenical poisoning traced to beer; people who had been in the habit of using coke for the roasting of hops and malt, no longer employing it for this purpose. A fall in the price of tar had been responsible for a further loss of about £4000. The Committee had this year to pay £500 more in rates; and a sum of £4100 had to be set aside as the first instalment of the sinking fund in connection with the purchase of the undertaking of the North Bierley Gas Company. He was sorry to inform the Council that there had been a loss this year by supplying gas at the present price of no less than £10,000. There was also the large undertaking of public lighting to be considered, which had cost this year £30,000. In view of these figures, he rejoiced that Mr. Guy had been bold enough to put down the resolution standing in his name.

The minutes having been confirmed,

Mr. GUY moved—"That, in the opinion of the Council, it is inexpedient to continue the existing system by which the cost of street lighting is borne by the Gas Committee, and consequently falls upon the present gas consumers; and that as from the close of the present financial year an arrangement be entered into between the Gas Committee and the Finance and General Purposes Committee whereby an agreed sum (subject to any necessary modifications from time to time) shall be paid to the Gas Committee towards the cost of such street lighting, and that such sum from time to time estimated to be required shall be included in, and form part of, the general district rate." He said the object of the resolution was to secure that the cost of street lighting should be borne by the whole body of the ratepayers, instead of coming out of the pockets of the gas consumers. It was quite impossible to supply gas at near cost price as long as the street lighting had to be paid for out of the profits.

One member here intervened with the suggestion that, owing to the lateness of the hour, the resolution should be deferred till the next meeting; and another member pointed to the small number of councillors present.

Mr. GUY (continuing) said the matter was of such importance that he thought time might be spared for its discussion. Under the present system, consumers of electricity did not pay a single penny towards

the cost of street lighting; and some of them had not paid anything since 1891.

Mr. FREEMAN seconded the resolution; remarking that his Committee would accept it as it stood.

Alderman PRIESTLEY moved, and Alderman WADE seconded, that the matter be referred to the Gas Committee.

Mr. JOHNSON thought it was unjust that the Gas Committee should light the city at large.

The amendment that the matter be referred to the Gas Committee was defeated by 26 votes to 19; and Mr. Guy's resolution was then adopted as a substantive motion.

COVENTRY GAS MANAGERSHIP.

The Coventry City Council again had before them, on Tuesday last, the question of the future management of the gas undertaking. The Mayor said that, at the last public meeting of the Council, the Chairman of the Gas Committee brought forward a recommendation from the Committee dealing with the question of the rules and regulations to govern the appointment of a Gas Manager. This proposition was met by an amendment by Alderman Andrews; and it was felt that the question was one of such a nature that it would be better discussed in committee. No time was lost; the Council holding a meeting the same afternoon. They met in full numbers—he thought there were only three absentees—and the matter was gone into and discussed fully, freely, and, he thought he could say, fairly. After due consideration, the Council in committee—not unanimously, but by an overwhelming majority—decided to endorse the action of the Gas Committee. He therefore now proposed that this endorsement should be confirmed by the Council, and the report of the Committee adopted. Mr. Rotherham (Chairman of the Gas Committee) seconded. Mr. West said that, before it was put, he should like a statement to be made by the Chairman of the Gas Committee as to whether the report to be obtained from the expert was to be a single one, or one that the Committee might have whenever they liked to call for it. An impression had got abroad in Coventry that a report was to be made by the expert at any time that the Committee liked to ask for it. Mr. Rotherham: Only one. The report was then adopted.

SOUTHPORT AND BIRKDALE GAS SUPPLY.

The Illuminating Power Controversy Settled.

We learn from a local correspondent that there has lately been every indication that the whole controversy between Southport and Birkdale in regard to the illuminating power of the gas would be re-opened, in connection with a proposal put forward by the Corporation of the former town to reduce it. This dispute has continued since the seventies; but it became acute in 1896, when, it may be remembered, the Birkdale Justices decided that Southport was compelled to supply 20-candle gas as measured by the 15-hole argand burner. The words "or other approved burner," in the clause governing the case, were ignored. In November of that year, it was determined to hold a conference with a view to coming to an agreement as to the burner which should in future be used for testing the gas. The decision of the Justices could not be accepted as a final interpretation of the statute, and an appeal, on the advice of Mr. Freeman, K.C., was to be made to the Court. This appeal was successful, and the decision of the Justices was reversed.

A proposal, emanating from Southport, that the whole matter in dispute should be submitted to Professor Vivian B. Lewes and Mr. C. R. Bellamy, of Liverpool, as Arbitrators, with the Chief Examiner for the Metropolis as Umpire in case of disagreement, was not considered by Birkdale; and Southport then decided to apply to the Local Government Board for a Provisional Order to amend the Southport Improvement Acts in respect to the illuminating power, the method of testing, and the maximum price of gas. They were advised, however, that the Local Acts contemplated one quality of gas for the whole district within the limits of supply, and that it was doubtful whether the Corporation were entitled to make a differential charge. The Corporation nevertheless decided on taking steps to obtain a Provisional Order. In the meantime, Birkdale had instructed its expert adviser, Mr. Bellamy, to prepare a report. He urged that he had never heard a good reason in favour of reducing the illuminating power of the gas; but if it were reduced, there should be a *pro ratâ* lowering of the price. A reduction to 16-candle power, measured by the "London" argand burner, would mean a drop to the extent of 30 per cent., and a proportionate reduction would bring down the maximum price from 4s. to 2s. 10d. per 1000 cubic feet. He recommended the use of Sugg's No. 6 table-top burner. It was urged by the Sub-Committee, in reply, that the proposed lowering of the illuminating power, instead of being 30 per cent., would be only 15 per cent., and that the maximum charge permitted being 4s. 6d., and not 4s., a *pro ratâ* reduction would bring the maximum price down to 3s. 10d.

No agreement could be arrived it with reference to the burner to be used for testing. Birkdale would only consent to the reduction of the illuminating power to 18 candles, measured by the "London" argand or by Sugg's "F" argand, and asked that the price charged to Birkdale should not exceed 3d. per 1000 cubic feet more than that charged in Southport. The rebate of 8d. was to remain in favour of Birkdale. A satisfactory settlement being impossible on these terms, Southport passed a resolution that, in future, the Sugg "G" burner be used for testing purposes. This was the position in which the controversy stood at the beginning of last week.

At the monthly meeting of the Southport Town Council on Tuesday, however, Mr. Trounson, in moving the adoption of the minutes of the Gas Committee, said, with regard to the application for a Provisional Order for the reduction of the illuminating power, he was happy to report that, as a result of negotiations between a deputation of the Council and the Chairman of the Birkdale District Council, they would obviate the anticipated opposition of that body. The terms of the agreement would be published in due course, after they had been put into shape by the Clerks of the two Authorities, and would tend to settle the differences which had so long existed. The terms would be mutually satisfactory, and he was sure the Council would be gratified that a collision with regard to the Order had been obviated, and the cost of obtaining it thereby minimized. The announcement was received with very hearty approval. We understand that both sides have given way on certain points. The arrangements made at a conference of the two Authorities were mutually advantageous and equitable—Birkdale consenting to withdraw opposition, and Southport reducing the price of gas supplied to Birkdale as a *quid pro quo*.

Since the foregoing was written, we learn that both Southport and Birkdale consent to the use of the same burner for testing purposes. This will be different from either of the two now employed by the respective authorities. The Local Government inquiry into the application of the Southport Corporation for a Provisional Order sanc ioning the reduction of candle power will be held at the Town Hall to-morrow (Wednesday). The opposition of Birkdale being withdrawn, it is confidently anticipated that consent will be given to the application.

GRAVESEND PUBLIC LIGHTING.

A Curious Discovery.

At the Meeting of the Gravesend Town Council last week—the MAYOR (Alderman J. H. Cooper) presiding—a matter of considerable interest with regard to the public lighting was under discussion. The minutes of the Paving, Lighting, and Works Committee contained the following letter from the Gas Company—dated Dec. 6—and an explanation of the Surveyor (Mr. F. T. Grant) on the subject to which it referred.

"This Company's Engineer yesterday reported to the Directors that he had lately tested 32 of the governors taken from the public lamps from various parts of the town; and he found that more than 30 per cent. of them had been deliberately tampered with, the valves regulating the quantity of gas to pass through the governors being fastened down with wire—the result being the consumption of a much larger quantity of gas than they were estimated to consume. How many more governors from other parts of the town have similarly been dealt with, we are not yet able to say. Of course, I am not for one moment suggesting that it is with the cognizance of any member of the Corporation that such a state of affairs exists; and I feel sure that every member of that body will do his utmost to ascertain who is responsible for such a gross fraud, so that the person or persons should be punished accordingly. My Directors thought it right that you should be informed of this at once, although their investigations with regard to the other governors are not yet completed."

The Surveyor reported that previous to any intimation being received from the Gas Company, he had complained to Mr. Davis, the Company's Manager, that burners (including regulators) were being removed by the Company, without notice, and not refixed until after lighting-up time; that the Manager then told him that a piece of wire had been discovered in one of the governors, but the Manager had not full particulars, and would speak to him when there was further information; that the next day Mr. Driver, the Corporation Gas Inspector, without any previous intimation from him, remarked that, as the Gas Company were removing burners, they might discover that one or two of the governors had been weighted with a piece of S hook to make them work, and that the Inspector had asked the Manager to let the Inspector have a meter to test the governors with; that the Manager had suggested that the inside of the governors should be oiled to make them work; that this had been tried, but with no lasting result; that knowing that the Manager had discovered the hooks, the Surveyor supposed there was an end of the matter. The Surveyor further reported that when the foregoing was communicated to him, he at once asked the Inspector whether there were any more S hooks fixed; and hearing that there were, he gave orders that they should be removed at once. The Surveyor also reported that he himself had often complained to the Manager of the sort of governors in use; that in certain weather they would not act so as to let the right quantity of gas through, and that he was making trials of another governor—viz., the "Borradaile"—with favourable results; that, in his opinion, the use of the S hook on the faulty governors did not make the regulators pass more than the agreed quantity of gas per hour.

The Committee had no recommendation to make on the subject.

Mr. ARCHER expressed surprise that no recommendation was made. The allegations contained in the letter were either true or untrue. He had no proposition to make; but it was unworthy of the Council to treat so important a matter in the way shown in the minutes.

Mr. DAVIS said this was exactly the line of action that he took in Committee. He would like to suggest that the Surveyor or Gas Inspector be called to give some explanation. It seemed to him that the Inspector had only done his duty. He would move that some explanation be asked from the Surveyor or the Inspector.

Mr. NAYLOR seconded.

Alderman FLETCHER said the Corporation had a contract with the Gas Company under which regulators were insisted upon; and that being so, what was the object of tampering with the regulators, unless it was to obtain a greater flow of gas than ordinary. Mr. Davis seemed to put himself forward as an expert; but a real expert would say that the only object of tampering with the regulators was to get more gas. If there was anything the matter with the regulators, they should have been repaired in the proper way. To defend conduct such as that referred to, was most unmanly. He had no objection to the explanation asked for being offered; but the Manager of the Gas Company (Mr. J. Davis) should have the opportunity of being present at the same time.

Mr. ENFIELD was sorry this matter had cropped up, thinking it would have been far better to have passed the minutes as presented. There was not the slightest doubt that a number of the regulators or governors had not acted properly; and when the Gas Manager was approached, he advised that they should be oiled. This was done, but proved no good; and the consequence was the regulators became jammed, and the Gas Inspector had recourse to a little piece of wire so as to cause them to work. The Inspector contended that the lamps did not burn more than the recognized quantity of gas, and this was his (the speaker's) opinion. As a matter of fact, the regulators fitted to the lamps were practically of very little use; and the Council should insist on the Borradaile regulator being substituted.

After some further discussion, the Gas Inspector (Mr. Driver) was

sent for to furnish an explanation of the matter. It was stated that the Gas Manager could not attend, as he was absent from the town.

Mr. DRIVER subsequently arrived, and was called upon by the Mayor to state his version of the case. He said that eighteen months ago he found the governors were not, in some instances, giving the light they should do. He immediately consulted the Gas Manager, who suggested the use of almond oil and black lead, but this treatment was not successful. The Manager promised to let him have a meter to test the quantity of gas passed by the defective governors; but this he failed to do. To remedy the defect, he (the speaker) applied a small piece of wire, the weight of which produced the desired effect. He did this quite innocently. He believed the consumption in some of the lamps, instead of being 4½ cubic feet per hour was not more than 2 feet. The low pressure was particularly noticeable after 11 o'clock at night. The Manager said he would not allow the Borradaile governor to be used; but the Surveyor had since authorized him to employ it. He believed the pressure in the pipes in the evening was 20 10ths, but that it was altered to 10-10ths after 11 o'clock. He was not able to say what pressure was sufficient to supply the public lamps satisfactorily. The Gas Manager could not repudiate his suggestion as to the use of black lead, if he adhered to the truth. He did not report the matter to the Surveyor in the first place; but he did afterwards. He put the weight on before speaking to the Surveyor. He was not authorized by any member or officer of the Corporation to do so. When he went round and saw the light deficient, he took steps to remedy it. He had no means of testing the pressure of gas, seeing that the promised meter was not supplied him. He began to weight the governors about twelve months ago. The Gas Manager did not suggest that new regulators should be obtained to replace the defective ones. He had found about twenty cases in which an S hook had been put on the regulators, not by himself, but probably by his assistant, who had now left the Corporation employ. Only the copper wire had been used by himself.

The MAYOR moved that, having heard the explanation, the matter should go back to the Works Committee.

Alderman RUSSELL seconded.

Mr. DAVIS said the Inspector had acted very innocently, and all that was wanted was a withdrawal of the harsh expression of "gross fraud" used by the Gas Company concerning him.

The matter was then referred back to the Committee.

ENTERPRISE AT ILFORD.

A Progressive Gas Manager.

Those of our readers who were present at the meeting of the Southern District Association in November, or who have read the report of the proceedings thereat which appeared in the "JOURNAL" at the time, will doubtless remember the interesting particulars given by Mr. J. H. Brown, the Engineer and Manager of the Ilford Gas Company, as to an installation of high-pressure incandescent gas-lamps for which he succeeded in securing an order from an association of shopkeepers in the town, in the face of strong competition by electricity supplied by the District Council. It will have been seen, from the account of that smart piece of work which Mr. Brown gave, that the Ilford Gas Company have a Manager who is by no means deficient in enterprise; and further evidence is furnished of this fact by what transpired at a recent interview with a representative of the "Ilford Guardian," which is reported at some length in the issue of that paper for the 11th inst. The interview came opportunely in connection with an event of some importance in the Company's history. The growth of the demand for gas has necessitated increased storage; and this has been provided by the erection of a new holder, which was inaugurated by Miss Gladys Ashmole, the daughter of the Chairman of the Company, on the 8th inst., and named after her. The holder was designed, with its tank, by Mr. Brown, who gave the following particulars in regard to it: The tank, which contains 3,400,000 gallons, or 15,000 tons, of water, was commenced in March, 1900, and completed in December of the same year. About 117,000 cubic feet of ground were excavated, and the following materials were used in its construction: 2000 tons of puddle, 400 tons of cement, upwards of 1 million bricks, 4½ miles of hoop iron, and 1250 tons of sand. The holder, which will contain about 2 million cubic feet of gas, is 158 feet in diameter, and 120 feet high to the top of the standards, was completed in September last year. Prior to the inaugural ceremony, Mr. Ashmole took the opportunity of congratulating Mr. Brown upon the completion of what he characterized as a fine structure, which, he said, reflected great credit upon him, although it had no doubt caused him many hours of anxiety. Extraordinary care had been bestowed by him upon every detail; and it was a matter of satisfaction that no lives had been lost during the progress of the work. The Chairman also congratulated the Directors upon the fact that the holder would be of very great assistance, now that so large a demand for gas had to be met.

Reverting to the interview, Mr. Brown, in the course thereof, told the local journalist not only a lot of things which enabled him to make "copy" for his paper, but which it may be useful to reproduce for the benefit of the narrator's colleagues in the gas profession. Mr. Brown went to Ilford in April, 1898, as Assistant-Manager, the Company having a Consulting Engineer; and a short time afterwards he was appointed Engineer and Manager. His first task was to design new works for the Company; and these are now in progress. When completed, he estimates that they will produce 12 million cubic feet of gas per day. The Company was formed in 1839 with a capital of £1500, and the price charged was 8s. per 1000 cubic feet. Now it is 3s. 6d. In 1891, the make was 16 millions; in 1900, it was 138 millions; in 1901, more than 170 millions. This was an increase of 33 millions in one year, the largest in the history of the Company. The demand continues at an enormous rate; and, curiously enough, it dates from May last year, when the electric light works were opened. These works have a capacity of 348 electrical horse power; the gas-works send out 43,000-horse power per day. Putting the power as candle light, the Company's is 2,000,000, and the Council's 2800 per hour. There were 272 consumers of the new illuminant; but many of them the Company never had. Mr. Brown is naturally proud of his achievement in shop-lighting already alluded to, and he told his interviewer about it. He also mentioned that one customer of the Council, who was dissatisfied with the electric light, came to him to have it cut off and a supply of high-pressure gas laid on. The Company are prepared to undertake installations of this system from two to a thousand lights; and they now have 15 high-pressure motors at work. As to the future of gas, it would be more used than ever, but its illuminating power would be of less importance than its calorific value. Mr. Brown gave his interviewer an account of what is now being done in this direction by the South Metropolitan Company and other suppliers of gas, whose example he thinks of following. As to Mond gas, which it has been suggested their Company should supply, it would be of no use for domestic purposes. He pointed out that of 27 companies started to supply fuel gas, apart from the Mond, 22 had collapsed, and not a single one had paid a penny of dividend. Questioned as to the position of the electric light undertaking at Ilford, Mr. Brown replied cautiously. He, however, went so far as to say he thought its municipalization was a mistake, and that the scheme would never pay. The Company could, however, supply it from their works, producing the current by gas-engines. After a little more conversation, the interview closed.

PUSHING BUSINESS AT LONG EATON.

It will not be the fault of Mr. G. Stevenson, the Secretary and Manager of the Long Eaton Gas Company, if the business during the current year does not increase considerably. He is not a believer in hiding his light—or his power either, for that matter—"under a bushel;" and if he does not literally, "set it on a candlestick," he at all events attracts attention to it by means of circulars and in the advertisement columns of the local paper. Evidence of this is afforded by a copy of the "Long Eaton Advertiser" for Friday which has reached us. In the first place, the Company announce a reduction in price to 3s. per 1000 cubic feet as from the beginning of the year, subject to 5 per cent. discount monthly for accounts of more than £30 per quarter. Next, they announce that they are prepared to supply and fit, free of charge, for new customers, a "slot" meter, a cooker, two brackets, and a pendant; thus granting to cottagers the boon of obtaining gas by the pennyworth. And what this quantity of gas will do is brought home to them in a striking way by a reproduction of the show-card which Mr. John Young, in his paper on "Selling Gas" at the meeting of the Eastern Counties Association early last year recommended for exhibition in gas offices. Lastly, the Company have made a bid for the support of the power-users in the town. Under the provisions of their Act of last year, they have adopted certain regulations with regard to internal fittings, particulars of which they publish; and they arrange to supply and fit up engines, dynamos, and motors, with all necessary fittings (gas or electric), either for cash or on the deferred-payment system. In order to encourage the use of gas for the production of motive power, they have reduced the price to the uniform figure of 2s. 5d. net per 1000 cubic feet. They point out that this is a very low rate for gas of the calorific value of that supplied by them; and when they add that it is equal, for motive purposes, to electricity at about ½d. per unit, while for generating current for lighting the cost of gas is less than 1d. per unit, they put forward a very strong case for the serious consideration of the parties concerned.

BURSLEM CORPORATION GAS SUPPLY.

Reduction in Price.

At the last Meeting of the Burslem Town Council, the minutes presented by the Gas Committee set forth that the subject of the price of gas had been under consideration; and they recommended that a reduction of 2d. per 1000 cubic feet should be made, a further reduction of 1d. per 1000 to all consumers using over 50,000 and under 100,000 cubic feet of gas in any quarter, and of 2d. per 1000 to every consumer using more than 100,000 feet in any quarter. These reductions, it was suggested, should come into force in the March quarter, and to be in addition to the usual discount for payment within one month after demand. Mr. Leigh, in proposing the adoption of the minutes, said he wished to suggest another basis than that named on which the reduction might be placed. The alteration was as follows: "That the price of gas be reduced from 3s. 6d. to 3s. 4d. per 1000 cubic feet, and that the following discounts be allowed: 5 per cent. on all ordinary accounts if paid within one month from the delivery of the invoice, 7½ per cent. on accounts where 50,000 and less than 100,000 cubic feet have been consumed in any quarter, 10 per cent. on accounts where 100,000 cubic feet and more have been consumed in any quarter—the present allowance of 2d. per 1000 feet for power purposes to be continued." Mr. Leigh observed that the Committee had thoroughly considered the question, and thought it right to make a moderate recommendation of the kind submitted. The Council would probably be interested in what might be called the differential rating. He thought the recommendation was perfectly fair and equitable, seeing that some time ago the Council had abolished meter-rents, and had agreed to let out gas-cookers without charge, and so had shown much consideration to the ordinary user of gas. This alteration had had a very material effect on the accounts, and one which was not sufficiently covered by the change suggested that day. Alderman Edwards explained that he did not vote at the meeting of the Committee. The motion was carried. Mr. Malkin suggested that there should be a common basis of charge up to 50,000 cubic feet of gas consumed, and that an allowance should be made for the quantity burnt over and above 50,000 cubic feet. He thought they might charge 3s. 4d. up to 50,000 cubic feet, less 5 per cent. reduction; the same figure for quantities between 50,000 and 100,000 cubic feet, but less a reduction of 7½ per cent.; and also for quantities above 100,000 cubic feet, but less 10 per cent. This suggestion was put in the form of a proposition; but on Mr. Leigh promising to bring the matter before the Committee, it was withdrawn.

SUPERANNUATION OF CORPORATION EMPLOYEES.

Discussion in the Glasgow Town Council.

At the Meeting of the Corporation of Glasgow last Thursday—Lord Provost Chisholm presiding—the Committee on Gas Supply reported that, on the suggestion of Bailie Stevenson, it had been agreed to recommend that a Special Sub-Committee be appointed to consider and report as to the expediency of reviving the application which was embodied in the Corporation (General and Tramways) Order of 1901, but was subsequently withdrawn, for obtaining statutory authority to establish a superannuation fund in connection with the Gas Department, with power to confer with the Secretary for Scotland, and ascertain whether the necessity which seems to exist for registering the scheme for such a fund under the Friendly Societies Act could not be dispensed with. Mr. W. F. Anderson thought that the Council should have a report as to the cost before the procedure recommended was adopted. He said that at present, assistance was given to the extent of £694 10s. 6d. per annum; while, if a scheme on the lines suggested were approved, the annual cost would be £5500 at 2½ per cent. on the wages paid, which were £221,436 3s. 4d. Treasurer Murray challenged the accuracy of Mr. Anderson's figures, and pointed out that the preparation of a scheme would involve a considerable amount of labour and some expense. Mr. Anderson said that as the Committee did not accept his suggestion, he would put it as a motion. Bailie Stevenson said the Corporation had applied to Parliament for powers to institute a superannuation scheme, and found that it was necessary to register it under the Friendly Societies Act. As under that Act it might have been transferred to some other Friendly Society, which the Corporation could not tolerate for one moment, they wanted to find a way out of the difficulty. Mr. Hugh Alexander supported the minutes. He said it was a mistake to assert that the scheme would cost 2½ per cent. on the wages. The Tramway Committee had not only a superannuation scheme, but a friendly society scheme, and their whole contribution was 1·39 per cent. They contributed 4d. per pound, but only 1d. was set aside for superannuation. Mr. Fife said he believed the total sum contributed by the Committee up to 1901 came to 7s. or 7s. 6d. per cent. on the wages. Mr. R. M. Mitchell, the Convener of the Gas Committee, thought the Corporation ought to feel obliged to the Committee for bringing forward this subject. They were not acting in their own interest only. They were simply asking for powers to approach the Secretary for Scotland to ascertain if the objections against a scheme which was unanimously agreed to by the Corporation could be removed. When they obtained the information, they would call the Conveners together with the view of preparing a scheme which would apply to the whole of the departments.

On a division, the motion was carried by 43 votes to 19.

Bailie Stevenson subsequently moved that the Gas Committee be empowered, in considering the question of instituting a superannuation fund for the employees, to confer with the other departments of the Corporation, and make a general recommendation if so advised. Mr. Gray moved the previous question. He said he did not think that the Gas Department was the proper one to enter into correspondence with the others. Mr. Anderson seconded the amendment. If, he said, they agreed to pension every official in the employment of the Corporation, it would mean an addition to the rates of 2d. in the pound. Mr. Shearer said that if a scheme were adopted, it would not mean a single penny more on the rates. He suggested that the motion should be altered to read: "The Gas Committee be empowered, in considering the question of instituting a superannuation fund for its employees, to confer with Special Committees to be appointed by the other departments of the Corporation, and make a general recommendation if so advised." Mr. Dickson seconded this. After further discussion, Mr. Shearer withdrew his amendment, and a show of hands was taken between Bailie Stevenson's motion and the previous question; the result being that the motion was carried by a large majority.

MONTE VIDEO GAS COMPANY, LIMITED.

Proposed Issue of Perpetual Debenture Stock.

An Extraordinary General Meeting of this Company was held last Thursday, for the purpose of considering, and if thought expedient passing, a resolution authorizing the Directors to create and issue perpetual first mortgage debenture stock, bearing interest at the rate of 5 per cent. per annum; the issue to be at such times and on such terms as the Directors deemed advisable, but the amount of the stock outstanding not to exceed £80,000 at any one time, without the authority of a general meeting. This was the substance of the notice read by the Secretary (Mr. Henry Kearns). The Chairman (Mr. T. C. Tatham), in moving a resolution in accordance with the notice, stated that in 1890 it was decided to alter and extend the works; it being supposed that the Company would have a large increase in business. For this purpose, they issued debentures to the extent of £58,000; and it was thought that the holders of these debentures would exchange them after a few years for the unissued shares, which then amounted to £58,000. The opportunity came for this in 1896; but the debenture holders then found it was not worth their while to take the shares. It was clearly the intention at the time that the new works should be paid for by the issue of extra capital. Since 1896, they had paid off £31,000 of the debentures. But, of course, this came out of the working capital; and he need hardly remind the shareholders that, whatever the state of the Money Market at the time these debentures became due, they had to provide the money. It was to the interest of the Company that they should not further deplete the working capital; and it would be better if they had the debentures fixed than being obliged to pay them off from time to time. The Board therefore suggested they should have the power to issue up to £80,000. It was not their intention, however, to issue more than £58,000 at present. By this means, they would avoid the depletion of their reserves, and the difficulty, which might occur at any time, of having to find money when it was dear for paying off the debentures. He thought it was always desirable that industrial companies of this kind should be as independent and as free as possible. This was not an increase of capital in any way. Mr. A. H. Barber seconded the motion; and, after a little inquiry and suggestion by shareholders, it was unanimously passed.

MIDDLESBROUGH GAS SUPPLY.

Improved Plant Needed.

Mr. David Terrace, the Gas Engineer of the Middlesbrough Corporation, has brought under the notice of the Gas Committee the present inadequate state of the works. In the course of a report on the subject, he says: "The conditions under which gas manufacture is being carried on at present (mid-winter) are not favourable to good results, either for quality or quantity. The state of the carbonizing plant is well known to the Committee; and the circumstances that one-fourth of the retorts are being replaced, and that at any time a slight divergence from regular working would cause a shortness of gas supply, tend to make our position a very trying and anxious one. The available storage capacity being only half-a-day's consumption also adds greatly to the difficulties under which we are supplying gas to the town. Again, it has been proved in actual working that the new purifiers require roofing over to protect them from variations in temperature (on one day lately we found the temperature of the gas 32° instead of 60° Fahr. as in ordinary working); cold weather greatly affecting the quality of gas. In very stormy weather, it is found impossible to clean out the spent oxide, &c., and re-charge with new purifying material."

GAS LIGHTING IN PADDINGTON.

At the Meeting of the Paddington Borough Council last Tuesday, the Works Committee recommended that Harrow Road should have additional lamps with incandescent burners; and also that, at a cost of about £91, five streets in the Borough should be provided with Welsbach incandescent burners. Replying to observations and suggestions made during a discussion on the point, Mr. Whur, for the Committee, stated that, though the Edgar light was eminently suitable for offices, it was useless for streets. The whole of the lighting of the borough would be considered at an early date. The recommendations were agreed to.

A petition was received from persons residing in the neighbourhood of Oxford and Cambridge Terrace, (see "JOURNAL" for Dec. 31, p. 1747) praying for more light, and especially mentioning the Kitson system, which had been in operation there for some time. Colonel Blair said the Works Committee considered that, though the Kitson light was above reproach for the illumination of large workshops or railway yards, it was unsuitable for street illumination. The Committee thought it was more satisfactory to have several lights of 100-candle power each close together, than more powerful lights some distance apart. It was decided to inform the petitioners that the retention of the Kitson lights could not be agreed to, but that Welsbach burners with improved lanterns would soon be installed.

SALES OF STOCKS AND SHARES.

At the Mart, Tokenhouse Yard, E.C., last Tuesday, there was a large attendance at the sale conducted by Mr. Alfred Richards, which included new issues of capital for the Directors of the Tottenham and Guildford Gas Companies, the Aldershot Gas and Water Company, and the South Essex Water Company; and every lot offered was sold at very fair prices. The instructions in regard to the Tottenham were to submit £10,000 of additional "B" consolidated stock, being a portion of the additional capital authorized by the Company's Act of 1898. It ranks for a standard dividend of 3½ per cent., subject to the sliding-scale; the last dividend on the Company's existing "B" capital having been at the rate of 4 per cent. per annum. A reduction in the selling price of gas having taken effect as from the reading of the indices of meters at the Christmas quarter, this stock would, by virtue of the sliding-scale, be entitled to a dividend for the half year to June 30 next at the rate of 4½ per cent. per annum, if earned. It was offered in £100, £50, £25, and £20 lots, realizing £100 and £100 5s. per cent. The Guildford Gas Company's issue was £5000 of ordinary stock, ranking for a standard dividend of 5 per cent., subject to the sliding-scale. It was sold at prices ranging from £108 5s. to £110 per £100 of stock. Some 4 per cent. perpetual debenture stock of the Aldershot Gas and Water Company fetched from £100 to £102 10s. per cent.; and some 5 per cent. ordinary stock of the South Essex Water Company, entitled to a dividend at the rate of 4 per cent. per annum, £106 10s. and £107. At a recent sale at Southsea, Messrs. Penney and Clark disposed of shares in various local and other companies. Some £5 shares (last dividend 5 per cent.) in the Woking Water and Gas Company fetched £4 12s. 6d. each; a few £10 shares (8 per cent.) in the Walton-on Thames and Weybridge Gas Company realized £17 5s. each; and six £10 shares (1857) in the Portsmouth Water Company, £28 a piece—the £5 shares of the 1879 and 1883 issues selling for £9.

Abercarn Gas-Works Purchase Question.—At a special meeting last Tuesday, the Abercarn District Council decided to proceed with the Bill deposited in Parliament for the purchase of the gas-works. It was, however, agreed that the Company should again be offered £9120 for their undertaking; and, failing their acceptance of this, that arbitration should be proposed.

BYE-PRODUCTS COKE MAKING IN THE UNITED STATES.

A recent issue of the "Chemical Trade Journal" contained the following statistics, extracted from the 21st annual report of the United States Geological Survey for 1899-1900, showing the magnitude and rapid development of the bye-products coking industry.

The quantity of coke made in bye-products ovens in 1899 was more than three times as large as that of the preceding year, while the number of completed ovens was nearly double. In 1895, there were 160 ovens built and 120 building, with a production of 83,038 short tons; in 1897, 280 ovens built, 240 building, and 261,912 short tons production; in 1898, 520 ovens built (280 Semet-Solvay, 180 Otto-Hoffmann, and 60 Newton-Chambers), 500 building (all Otto-Hoffmann), and 294,445 short tons production; while in 1899, the figures were 1020 ovens built (280 Semet-Solvay, 680 Otto-Hoffmann, and 60 Newton-Chambers), 65 building (all Semet-Solvay), and 926,534 short tons production. The numbers for 1899 include only those ovens actually in existence or building at the close of the year.

The value of tar, ammoniacal liquor, sulphate of ammonia, and surplus gas recovered in the manufacture of coke in retort-ovens in 1899 reached the figure of $944,537, divided as follows: Tar, 104,687,330 lbs., valued at $207,652; ammoniacal liquor, 1,572,325 gallons, and $180,642; sulphate of ammonia, 11,984,931 lbs., and $330,921; and surplus gas, 1,996,124,697 cubic feet, valued at $225,022.

The amount of coal used in the manufacture of coke in the United States in 1896 was 18,694,422 short tons; in 1897, 20,907,319 short tons; and in 1898, 25,249,570 short tons. In 1899 this figure had increased to a total of 30,219,343 short tons. In 1896, the States imported 43,372 short tons of coke, valued at $114,713; in 1897, 34,937 short tons, worth $98,077; in 1898, 46,127 short tons, worth $142,334; while the imports for 1899 were 31,197 short tons, valued at $142,504. The exports of coke during the same years were as follows; 1896, 169,189 short tons, value $533,600; 1897, 173,034 short tons, value $546,066; and 1898, 199,562 short tons, value $600,931. In 1899, the exports had increased to 280,196 short tons, with a value estimated at $858,856.

The Government officials at Washington emphasize the fact that the continued success of the bye-products coke-making establishments already in existence, and the extension of this system of carbonizing, depend upon the ability of the producers to secure profitable markets for the products. They point out the advisability of working up the recovered ammonia into the form of such salts as are at present imported from Europe, to supply the already considerable domestic demand, and they anticipate, as a result of the extension of the bye-products system of coking, a considerable decrease in the importation of ammonium carbonate and other salts of ammonia. Further, the increase in the use of bye-products coke-ovens should be followed by the establishment of works for the manufacture of aniline colours and coal-tar products generally, which in 1899 were imported to the value of over $8,000,000.

Our contemporary remarks on this subject: "Should this remarkable development of the industry be continued, with the bye-products coke-ovens of the United States recovering ammonia from a continually increasing carbonization of coal, and the Mond gas process obtaining some 80 lbs. of sulphate per ton of slack used, the unfavourable effect upon the market for sulphate of ammonia can scarcely fail to be very considerable."

ELECTRIC LIGHTING NOTES.

Electricity Works Extensions at Hull.

Hull is going in for a considerable extension of its electricity works; and for the purpose £47,900 is required. On behalf of the Local Government Board, Colonel Hepper has inquired into the matter; and it appears that the Sculcoates Lane works are to be largely extended and additional high-tension mains laid. The extension will accommodate plant of nearly 5000-horse power, of which machinery about one-third is proposed to be installed at present. Since the establishment of the electric supply nine years ago, the number of consumers has increased from 148 to 1771, the lamps connected from 8035 to 112,312, and the selling price has been reduced from 7d. to 4½d. per unit.

Street Explosion at South Shields.

An explosion which wrought some havoc and created much alarm, occurred on the morning of Saturday, the 11th inst., in Commercial Road and Laygate Street, South Shields. Several loud reports were accompanied by the sudden upheaval of the heavy metal coverings of the underground electrical boxes and large blocks of flagging, and the atmosphere immediately became charged with escaped gas. The first of the boxes affected was completely shattered; and such was the force of the concussion that the windows of the houses over a considerable area were broken. Seven or eight of the sub-stations were more or less damaged. In one case, a ponderous metal lid was blown over a wall, and dislodged flags were carried more than a dozen yards away.

Salford's Electrical Finances and New Works.

An application to the Local Government Board for permission to borrow £5000 for the provision of electric motors to be let on hire, and £25,000 for electric lighting, was considered last Thursday by Mr. M. K. North, one of the Inspectors. The Corporation have now considerable electrical works, and consequently a large amount of power at disposal. According to Mr. Greenhalgh, who represented the Corporation at the inquiry, it is intended by the Electrical Committee to obtain 100 motors of an average size of 5-horse power—the actual sizes ranging from ½-horse power to 25-horse power. This will absorb £4700, and the remaining £300 is to meet the cost of testing and fixing. Up to the present, motors equal to 300-horse power have been connected. The Corporation are already supplying current for power at 2d. per unit; and no doubt if the demand increases, they will reduce this figure. Mr. Greenhalgh expects that, in a year or so, the concern will be remunerative; but last year there was a loss of £7311.

Manchester's Great Electrical Scheme.

With the laying last Thursday of the foundation stone of the Stuart Street electricity generating station of the Manchester Corporation, a commencement was made with the largest installation of the character in Europe. The land which has been acquired for the station is something like 8 acres in extent, without taking into account the sub-stations that will have to be established. The preparations for the carrying out of the first two parts of the scheme are now being brought to completion. The first part is based on plans and specifications prepared by Dr. Kennedy for the development of energy representing 15,000-horse power. The other part is based upon plans and specifications by Mr. Metzger, the City Electrical Engineer, and provides for energy representing 12,000-horse power. Eventually, according to the project, the station will possess plant equal to 70,000-horse power. The cost of the first two instalments will amount to close upon £1,000,000—perhaps more. The work now actually in progress is officially described as follows: The buildings are steel-framed structures; the walls being filled in with brickwork. The engine-house is 114 ft. 6 in. long, 131 feet wide, and 60 feet high; being divided into two bays of 53 feet wide. Each bay will contain three engines of 2500-horse power. There is also a centre bay of 25 feet, containing the condenser plant, and other machinery. The boiler-house is 200 feet long, 93 feet wide, and 53 feet high. The first instalment of plant consists of 24 Babcock and Willcox boilers, supplying steam for engines of a capacity of 15,000-horse power. Efforts are being made to get the first two engine sets of 2500-horse power each running by May next.

Poplar's Expensive Luxury.

According to an article in the "Daily Express" last Wednesday, electricity is proving an expensive luxury for the borough of Poplar. We are told that the new system of street lighting is costing so much more than the original estimate, that meetings are being arranged by the indignant ratepayers to protest against the heavy burden imposed on them by the Borough Council. In 1897, an electrical expert advised that a fairly good system of electric lighting could be secured for £45,000, yielding a substantial profit at that figure; but the then Board of Works were asked, on the Engineer's report, to approve an outlay of £62,000. During the progress of the work various additions were made, and a further expenditure of £62,000 for extensions at the station and for arc lights around the Isle of Dogs was recently authorized. The Borough Council are now pledged to a capital charge of altogether £174,000 at 3¾ per cent.

It appears that 31 miles of cables have been laid at a cost of £62,000. The other expenditures up to Sept. 30 last include the following items: Buildings, £22,217; machinery, £20,075; accumulators, £2142; meters, £1455; indicators, £632; instruments, £234; tools, £346; office furniture, £147; incandescent lights, £359; and expenses, £436. Each arc lamp in the East India Dock Road costs £27 per annum, whereas each gas-lamp costs only £3 9s. per annum. In 1899, gas lighting cost £1165; while the electric light estimate for Christmas, 1901, came to £2754. In the original report on the electric light system, it was estimated that electricity could be generated at the works for 3d. per unit; the actual cash price works out at 5¾d., including meters. For power purposes, the Council supply electricity at 1½d. per unit. How profit is expected puzzles the taxpayers to comprehend. The loss on the first year's working alone is £1811. The Council have decided to place 155 arc lamps in various streets. These will cost £32 15s. 6d. each to erect, and the additional annual expense over the present system of gas lighting is £1752.

Truro's Dream.

The Truro Corporation had a little discussion on Tuesday evening which served to show that, even among people who ought to know, there is still a good deal of ignorance as to the possibilities of producing electric light cheaply. One would have thought that the experience of Worcester, and the little encouragement now given to the idea by electrical engineers, would have dispelled the notion that where a river exists electricity can be generated for little or nothing, and that Corporations have only to lay down turbines and dynamos and then wait for the municipal millenium. That this is not the case, is shown by the fact that Mr. Sylvanus Trevail, one of the members of the Truro Town Council (a gentleman with considerable experience of public affairs, and widely known in his own profession of an architect), strongly advised the Council to carry out electric lighting because water power was easily accessible, and they could do it so cheaply. No one, said Mr. Trevail, could dispute that electricity was infinitely superior to gas. Some people, we think, might even do this. He might at least have added that it is infinitely dearer. Instead of this, he pointed to the example of Plymouth, where he said gas was only 2s. per 1000 cubic feet—50 per cent. cheaper than at Truro—and yet they had gone in for a large electric lighting scheme. Mr. Trevail did not add, as he might have done, that the undertaking is financially a failure; and that, with all the advantages which the Corporation derive from charging what they like for street lighting and from having a big customer in the electric tramways, they have a heavy balance on the wrong side of the account. A further remark of Mr. Trevail's, to the effect that incandescent gas lighting is a failure, and "only made the darkness visible," if meant to be of general application, and not to apply merely to some place where the system is imperfectly understood or carried out in a negligent manner, is so obviously absurd as to suggest that Mr. Trevail's vision is defective. His remarks, at all events, did not convince his fellow members. Mr. Rose reminded the Council that the subject was under consideration two years ago, and at that time Mr. Headley, an Electrical Engineer whom they consulted, did not express the sanguine view to which Mr. Trevail had given expression respecting the power to be derived from streams. He added that the opinion which was then formed as to the probable demand for electric lighting did not encourage its adoption at that time, besides which they had an idea that gas in one of its cheaper forms would prove to be the most economical agent for generating electricity. Mr. Rose added that he was hopeful that they would get electric lighting in course of time; but they must not expect it too soon. A Committee are, however, to further consider the subject.

City Explosions.

The explosions in connection with the systems of the City of London and Charing Cross and Strand Electric Light Companies on Jan. 4 and 5 have been the subjects of inquiry by Mr. A. P. Trotter, the Electrical Adviser to the Board of Trade. Evidence was plentiful to the effect that, before the occurrence of the actual explosion, smoke and flames were seen by various persons issuing from the manholes that are connected with the electrical systems in Newgate Street and Ludgate Hill.

But the most interesting evidence to gas engineers was that given by Mr. W. H. Patchett, the Chief Engineer of the Charing Cross Company. He stated that on the Friday before the explosion the indicators showed that leakage was taking place; and a part of the system was disconnected in order to find it. This was done at one o'clock on Saturday, and the Engineer in charge of the works then stopped disconnecting. He left instructions to have other disconnections made ready for work at ten o'clock on the Monday morning. At about 1.20, the indicator showed that something was wrong; and the Engineer began to disconnect, and sent men to the Giltspur Street box. One man tried to get into the box, and was overcome, but soon recovered. While the men were at work, they received information from a consumer in King Edward Street that smoke was entering his cellar. Men were sent to disconnect outside the premises, and the first explosion there followed the lowering of the lamp. When the box was clear, the man went down himself and struck a match, which also fired the bitumen gas. The man managed to get out just as the flame reached him. The Corporation had communicated with his Company as to the inspection of boxes; and the reply sent was that it was not necessary to make a fixed rule as to inspection. Some of their boxes were inspected fortnightly, some monthly, and in some cases it was only necessary to inspect them every two months. He did not think it unwise to take a lighted lamp into the manhole. He accounted for the explosion by the fact that inflammable vapour was present in the chamber; the vapour being given off by bitumen. He did not think it was wise for the man to light the match after the first explosion. He could not say whether the explosions in the City Company's boxes were due to the explosion in his Company's box. He did not think there was any connection between the conduits of the two Companies. As a result of his investigations, he did not believe that any better system than that adopted by his Company could be followed for the safety of the public. The Company used no fuses in the streets, as fuses for heavy currents were sources of danger.

Then the next witness, Mr. William Bailey, Chief Engineer to the City of London Company, stated that they had conclusive proof that the explosion in his Company's box was owing to external causes. He believed the accident was due to the metallic covering of his Company's cables having had to carry a heavy leakage current through the fault in the Charing Cross Company's mains in Newgate Street. He strongly urged the necessity of the Charing Cross Company providing metallic covers, and considered that frequent inspection of the boxes was absolutely necessary. Mr. J. P. Buck, the Superintendent of the Mains of the City of London Company, said there were 65 cases of the Strand Company injuring his Company's mains. Mr. Trotter will report in due course.

GAS v. ELECTRIC LIGHTING IN YORK.

A Defence of Gas.

Copies of recent numbers of the "Yorkshire Herald" which have just reached us show that a lively discussion has been going on in its columns with respect to the relative merits of gas and electric lighting. The ball seems to have been opened in earnest early last month, by some remarks reported to have been made at the Council meeting on the 2nd by Mr. Gray. Among other things, he stated that the advance made in the price of gas by the Gas Company was "excessive," and had increased the charge for the public lighting of the city by £600. The worthy councillor's statements were considered at a meeting of the Directors of the Company; and the Secretary and Manager (Mr. Matthew Leaf) was instructed to reply thereto. He pointed out that the assertion as to the £600 was in excess of the fact; and he said his Directors thought it was hardly fair that such remarks should be publicly made without either giving comparative advances and prices in other towns, or supplying financial data upon which such statements should necessarily rest. He reiterated a statement made in a previous letter on this subject, to the effect that if the Council would compare the increased prices with similar charges for similar lighting in any town in the country, they would find the reasonableness of the Company's charges more than confirmed. If this had not been done, the Directors thought it was scarcely just to publicly charge them with making an "unfair and excessive" advance. Another member of the Council (Alderman Dodsworth), who is Chairman of the Electric Light Committee, appears to have asserted that he could light the streets for "at least £1000 a year less than they were paying the Gas Company." But the Directors preferred to leave this matter to the actual experience of electric lighting and incandescent gas street lighting of other corporations, and to the well-known opinions of many eminent electricians who had given preference to incandescent gas lighting.

In the issue of the above-named paper containing Mr. Leaf's reply, there appeared a "special" article giving a history of electric lighting in York, which was characterized by the writer as a "promising undertaking." The portion referring to street lighting is interesting:

> Mr. Midgley [the Electrical Engineer] is not so one-sided as to claim that the street lighting is perfect, and his views on this subject are worthy of consideration. He thinks there was in the first instance a tendency on the part of the Corporation to over-estimate the power of the arc lamps, and, as a consequence, the earlier ones were placed too far apart. As a result, when a light unavoidably blinks or jumps a little, the fact is far more noticeable, because the next light is not close at hand to cover up its momentary deficiencies. He cites the lighting of Bootham, where the lamps are better spaced, as more nearly approaching the ideal. Mr. Midgley says that the

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 142.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
590,000	10	Oct. 11	10½	Alliance & Dublin 10 p.c.	18—19	..	5 10 6
100,000	10	,,	7½	Do. 7 p.c.	13—14	..	5 7 2
300,000	100	Jan. 2	5	Australian 5 p.c. Deb.	97—101	..	4 19 0
200,000	5	Nov. 13	6½	Bombay, Ltd.	6¼—6⅜	..	4 16 4
40,000	5	,,	6½	Do. New, £4 paid	4¼—4⅜	..	5 9 5
380,000	Stk.	Aug. 15	12	Brentford Consolidated	265—270	..	4 8 11
270,000	,,	,,	9	Do. New	192—197	..	4 11 5
50,000	,,	,,	5	Do. 5 p.c. Pref.	130—135	..	3 14 1
206,250	,,	Dec. 13	4	Do. 4 p.c. Deb.	112—115	..	3 9 7
220,000	Stk.	Sept. 12	10	Brighton & Hove Orig.	213—218	..	4 11 9
246,320	,,	,,	7	Do. A. Ord. Stk.	150—155	..	4 10 4
420,000	20	Sept. 27	10	British	41—42	..	4 15 3
50,000	10	Aug. 15	12	Bromley, Ord. 10 p.c.	24—26	..	4 12 4
82,850	10	,,	9	Do. 7 p.c.	19—21	..	4 5 8
500,000	10	Oct. 11	6	Buenos Ayres (New) Ltd.	9⅛—10	..	6 0 0
220,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb.	94—97	..	4 2 6
150,000	20	July 17	8½	Cagliari, Ltd.	22—24	..	6 17 6
100,000	10	Sept 27	10	Cape Town & Dis., Ltd.	14½—15½	..	6 9 0
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	52—54	..	5 11 1
550,000	Stk.	Oct. 11	12	Commercial Old Stock	265—270	..	4 8 11
236,425	,,	,,	9	Do. New do.	203—208	..	4 6 7
238,237	,,	Dec. 13	4½	Do. 4½ p.c. Deb.	130—135	..	3 6 8
800,000	Stk.	,,	9	Continental Union, Ltd.	162—167	..	5 7 9
200,000	,,	,,	7	Do. 7 p.c. Pref.	160—165	..	4 4 10
575,000	Stk.	Aug. 29	5	Crystal Palace Ord. 5 p.c.	122—127	..	3 18 9
60,000	,,	,,	5	Do. 5 p.c. Pref.	123—128	..	3 18 2
486,090	10	July 17	10½	European, Ltd.	19—20	..	5 5 0
354,060	10	,,	10½	Do. £7 10s. paid	14—15	..	5 5 0
15,079,885	Stk.	Aug. 15	4⅛	Gas-light and Coke — 4 p.c. Ord.	98—100	+1	4 8 0
2,600,000	,,	,,	3½	Gas-light and Coke — 3½ p.c. max.	88—90	..	3 17 9
2,799,735	,,	,,	4	Gas-light and Coke — 4 p.c. Con. Pref.	111—114	..	3 10 2
4,063,425	,,	Dec. 13	3	Gas-light and Coke — 3 p.c. Con. Deb.	91—93	..	3 4 6
70,000	10	Nov. 13	8	Hongkong & China, Ltd.	13—14	..	5 14 4
3,800,000	Stk.	Nov. 13	10	Imperial Continental	210—214	..	4 13 6
473,600	Stk.	Aug. 15	3½	Do. 3½ p.c. Deb. Red.	100—102	..	3 8 8
561,000	Stk.	Aug. 29	10	Liverpool United A	232—234	..	4 5 6
718,100	,,	,,	7	Do. do. B	171—173	+½	4 0 11
306,083	,,	Dec. 30	4	Do. do. Deb. Stk.	117—118	..	3 7 10
75,000	5	Dec. 13	4	Malta & Medn., Ltd.	4½—5	..	4 0 0
560,000	100	Oct. 1	5	Met. of — 5 p.c. Deb.	106—110	..	4 10 11
250,000	100	,,	4½	Melbourne — 4½ p.c. Deb.	102—104	..	4 6 7
541,920	20	Nov. 13	3½	Monte Video, Ltd.	9—10	..	7 0 0
1,515,832	Stk.	Aug. 9	4½	Newc'tle & G'tesh'd Con.	105—107	..	4 1 9
312,855	Stk.	Dec. 27	3½	Do. 3½ p.c. Deb.	98—100	..	3 10 0
150,000	5	Nov. 28	8	Oriental, Ltd.	7⅝—8	..	5 0 0
135,000	4½	,,	8	Do.	6¾—7¼	..	4 19 4
15,000	1	,,	8	Do.	1¼—1⅜	..	4 11 5
60,000	5	Sept. 27	7	Ottoman, Ltd.	5⅜—5⅝ * Ex. div.	..	5 12 0

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
851,070	10	Oct. 11	7	River Plate Ord.	10—10⅓	..	6 13 4
250,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb.	94—97	..	4 2 6
250,000	10	Sept. 27	8	San Paulo, Ltd.	11—12	..	6 13 4
135,000	Stk.	Sept. 12	10	Sheffield A	242—244	..	4 2 0
209,984	,,	,,	10	Do. B	242—244	+1	4 2 0
523,498	,,	,,	10	Do. C	242—244	+1	4 2 0
5,761,885	Stk.	Aug. 15	5	South Met., 4 p.c. Ord.	125—127	+1	3 18 9
1,627,965	,,	Jan. 16	3	Do. 3 p.c. Deb.	91—93*	+½	3 4 6
380,940	Stk.	Nov. 13	5	Southampton Ord.	102—106	..	4 14 4
70,825	,,	Jan. 16	4	Do. 4 p.c. Deb.	102—107*	..	3 14 9
120,000	Stk.	Aug. 29	5½	Tottenham and Edmonton — A. 5 p.c.	122—127	..	4 6 8
250,520	,,	,,	4	Tottenham and Edmonton — B. 3½ p.c.	95—100	..	4 0 0
182,380	10	Jan. 16	5	Tuscan, Ltd.	7—8*	..	6 5 0
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	95—98	..	5 2 0
230,000	5	Aug. 15	9	West Ham, 10 p.c.	9½—10½	..	4 5 9
172,000	10	,,	6	Do. 7 p.c.	12½—13½	..	4 8 11
140,900	Stk.	Dec. 30	4	Do. 4 p.c. Deb.	105—110	..	3 12 9
				WATER COMPANIES.			
780,599	Stk.	Dec. 30	11½	Chelsea, Ord.	315—320	..	3 11 11
150,000	,,	,,	5	Do. 5 p.c. Pref.	150—155	..	3 4 6
160,000	,,	,,	4½	Do. 4½ p.c. Pref. '75	138—143	..	3 2 11
175,785	,,	Sept. 27	4½	Do. 4½ p.c. Deb.	140—145	..	3 2 1
1,720,560	Stk.	Oct. 11	7	East London, Ord.	197—202	..	3 9 4
654,740	,,	Dec. 13	4½	Do. 4½ p.c. Deb.	140—145	..	3 2 1
1,018,046	,,	,,	3	Do. 3 p.c. Deb.	96—98	..	3 1 3
700,000	50	Dec. 13	8	Grand Junction — 10 p.c. max.	113—116	..	3 9 0
310,000	Stk.	Sept. 27	4	Grand Junction — 4 p.c. Deb.	122—126	..	3 3 6
708,000	Stk.	Aug. 15	14	Kent	300—305	..	4 11 10
160,000	,,	,,	7	Do. New, 7 p.c. max.	200—205	..	3 8 4
1,043,800	100	Dec. 30	10½	Lambeth, 10 p.c. max.	293—298	..	3 10 6
406,200	100	,,	8	Do. 7½ p.c. max.	217—222	..	3 12 1
350,000	Stk.	Sept. 27	4	Do. 4 p.c. Deb.	125—130	..	3 1 7
500,000	100	Aug. 15	12⅝	New River, New Shares	395—405	..	3 3 2
1,000,000	Stk.	July 31	4	Do. 4 p.c. Deb.	125—130	..	3 1 7
902,300	Stk.	Dec. 13	7	Southwark and Vauxhall — Ord.	193—198	..	3 10 8
126,500	100	,,	7	Southwark and Vauxhall — 7½ p.c. max.	183—188	..	3 14 6
489,200	Stk.	,,	5	Southwark and Vauxhall — 5 p.c. Pref.	150—155	..	3 4 6
1,019,585	,,	Oct. 11	4	Southwark and Vauxhall — 4 p.c. A Deb.	124—129	..	3 2 0
1,155,065	Stk.	Dec. 13	10	West Middlesex	280—290	..	3 9
200,000	,,	,,	4½	Do. 4½ p.c. Deb.	137—142	..	3 3
200,000	,,	Sept 12	3	Do. 3 p.c. Deb.	96—98 * Ex. div.	..	3 1

whole of the streets could be lighted by incandescent lamps with a mean guaranteed candle power of 50, saving the city £700 a year. Chester, Leyton, Barking, Worthing, and other towns are, it appears, lighting the whole of their streets with electricity; and Mr. Midgley, referring to the argument that the arc lamps have been removed in Sheffield, Leeds, Bradford, and other towns, says that until very recently, the power stations at Leeds and Sheffield belonged to Companies, and Leeds has now decided to light many of the most important thoroughfares with arc lamps, while Bradford is considering a complete scheme of arc lighting. Although the cost of the arc lamps at present in use in York is from 50 to 60 per cent. more than was paid for gas, Mr. Midgley thinks that any fair-minded man must admit that the greatly superior light is well worth the extra money. On the new scale of charges, he calculates that the cost of lighting the city by gas would be £4896; and he informs us that the same candle power could be supplied by electric light for £4000.

Another letter from Mr. Leaf appeared in the "Herald" for Dec. 14. It was of considerable length, and dealt mainly with the remarks ex racted above. With regard to the saving of £700 a year, and the citation of Chester, Leyton, Barking, and Worthing as places where the whole of the streets are lighted by electricity, Mr. Leaf points out that this is not the case at Chester, where, moreover, the cost of the lighting is, he remarks, "considerably in excess of what it was a few years ago." Nor, he says, is Leyton being wholly lighted by electricity. On the contrary, the majority of the lamps, about 600, are gas-lamps, and only about 300 ordinary gas-lamps have been replaced by electric lamps; so that the electric light in Leyton, on the West Ham side, is only about 40 per cent. of the whole.

Mr. Leaf reproduces the following particulars supplied to him about the Leyton lighting, which will be of interest apart from the discussion which elicited them:

The Leyton Urban District Council, who own the electricity works, have from time to time substituted electricity for gas in some streets, not all; but the new streets have principally been lighted with gas, and the number of public lamps supplied with gas is considerably greater than previous to the advent of electricity, about six years ago. The Council restrict the lamps to use only 4 cubic feet of gas per hour; yet when they substitute electricity for gas, they place two (so-called) 16-candle power lamps in place of one gas-burner, and the result is generally admitted to be "an Irishman's improvement." Since the Council started their electricity works the general district rate has increased 6d. in the pound; while several councillors admit that "without the electricity works the rates would have been reduced in the same period by at least 3d. in the pound." On the Lea Bridge side of Leyton, about three miles of roads are lighted with gas, compared with one mile with electricity.

Mr. Leaf considers that Leyton is rather an unfortunate illustration of electric lighting. for last year the deficit upon the undertaking was £3292. As to Worthing, instead of the whole of the streets being lighted with electricity, only one-third of the lamps have been so lighted, and these are in the main thoroughfares. He had no information as to Barking, when he wrote his letter, but he sent it in a supplementary communication. It was as follows:—

The sample town of Barking has a population of 21,500. But although Mr. Midgley's report—presumably, of course—implies that all gas lighting in the streets of Barking is being replaced with electric lighting, my informant states that there has not been any gas lighting in the streets of Barking for "many years," and that the street lighting has been done with oil. It is, therefore, only fair to say, in this case, it is oil lighting and not gas lighting that has been superseded.

Mr. Leaf goes on to deal with the lighting in the other towns mentioned. In Leeds, he finds that the authorities have decided to put down additional arc lamps along several of the tramway routes in some of the principal streets; but beyond this Leeds has adopted the incandescent gas system. With regard to Sheffield, he learns that the only electric arc lamps now in use for street lighting are eight placed round the Town Hall, and this is after seven years' experience of both systems of lighting. His information from Bradford is that the statement that the town is considering a complete scheme of arc lighting is "absolutely untrue," and that the city is almost entirely lighted by incandescent gas-lamps, the "Chairman of the Electricity Committee having deemed it inadvisable to sanction any further extension of arc lamps for street lighting in view of the great improvement due to incandescent gas."

In the course of the extract from the "Herald" article already given, Bootham, it will be remembered, is cited by Mr. Midgley as possessing street lighting approaching the "ideal." Mr. Leaf has investigated this matter, and he says:

We find at Bootham that nine arc lamps have replaced 22 gas-lamps. The cost to the Corporation of these 22 lamps at the present price would be £64 16s. 9d. per annum, while the cost of the nine arc lights, at £20 each per annum, would be £180; or reckoning them at the promised reduced rate of £17 per annum, they would be £153. So that, even at the reduced rate of £17 per arc lamp, the cost would be 135 per cent. more than the gas-lamps displaced; and at the present rate of £20 per arc lamp, the increased cost would be 177 per cent. more than gas. I admit that if the whole of the are lamps at present in use in York—viz., 52—are taken into account, at the present rate of £20 each per annum, the total cost would equal 101 per cent. more than the cost of the flat-flame gas-lamps discontinued; and if at £17 per arc lamp, the total cost would equal 71 per cent. more than the flat-flame gas-lamps displaced, and not 50 to 60 per cent., as Mr. Midgley has stated. This difference in comparison arises from the fact that the gas-lamps already displaced by electric arc lamps were mainly in and about the centre of the city, and were largely composed of 10 feet and 17 feet lamps—the most expensive gas-lamps. But if electric lighting is extended, as is now being done in Church Street, Goodramgate, and Monkgate, and arc lamps substituted, as in Bootham, and similar lamps are displaced as in Bootham, then the difference in cost for the total lighting of the city would even be much greater in favour of gas.

Dealing with Mr. Midgley's statement that the whole of the streets of York could be lighted by incandescent lamps with a mean guaranteed power of 50 candles, saving the city £700 a year, Mr. Leaf points out that the comparisons are based upon flat-flame gas-burners, which is hardly fair to the Gas Company, seeing that they have given conditional prices to the Corporation for lighting the city with incandescent gas-burners. He admits that it is quite true that to light the ctiy by incandescent gas-burners would cost about 12½ per cent. more

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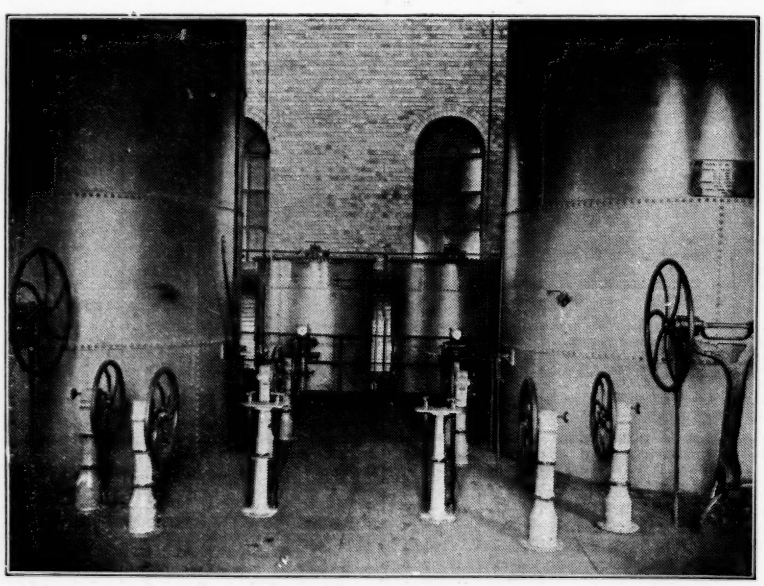

RESULTS PROVE EFFICIENCY.

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than the flat-flame burners; but the light given by the incandescent system would be fully four times that furnished by the latter burners. To ensure a mean guaranteed power of 50 candles will, he says, require each incandescent electric lantern to be fitted with (say) four 16-candle power glow lamps or their equivalent of an initial illuminating power of 64 candles, consuming 256 watts per hour. This, on the average number of hours the York street-lamps are lighted, will amount to (say) 880 units per lamp per annum. The Company have offered conditionally to supply incandescent gas-lamps giving a light of 75-candle power for £2 19s. 1d. each per annum. This price covers the charge for providing and maintaining the pillar, lantern, burner, mantles, &c., also the cost of lighting, extinguishing, and the gas consumed. Without taking into account the superior candle power of the proposed incandescent gas-lamp, and applying the same annual charge to the proposed incandescent electric lamp, the 880 units of electricity will work out at 0·805d. per unit, which will include interest on capital cost, maintenance, depreciation, and supply of current. But on referring to the published tables of costs of electricity supply undertakings belonging to local authorities in the country, and taking a dozen towns at random whose sales average more than a million units a year, Mr. Leaf finds that the cost per unit sold, including charges for interest, depreciation, and sinking fund, amounts to over 3¾d. And with any cost even approaching this figure he does not see, by any ordinary rule of arithmetic, how the proposed saving of £1000 or £700 a year can be effected. But as it is a business matter, and one which affects the pockets of the public, he says, "Let the public judge." He adds that, as a set-off to the promised conditional reduction in the present charge of £20 per annum for the arc lamp to £17, his Company have already publicly intimated that they anticipate being able to reduce the price of gas again this year.

The next chapter in the discussion is furnished by proceedings at the Council meeting on the 6th inst., when Alderman Dodsworth replied categorically to the statements contained in Mr. Leaf's letter in regard to electric lighting in other towns. He said the Engineer had communicated with the Electrical Engineers in the places mentioned, and he wished the Council to hear the other side. With regard to Leyton, the reply was: "We have in use in the public streets 63 arc lamps and about 300 incandescents, which in part have been substituted for gas, and in part have been put in new streets where gas has never been installed." As to Leeds, the answer was: "The arc lighting which has been installed in Leeds is still in operation, and there is no intention of altering it for incandescent gas." The reply from Bradford was: "We are not contemplating installing any large system of street lighting by electricity in this city. The reason for this is that the Gas Committee light the whole of the town free of cost to the ratepayers." Alderman Dodsworth went on to say that they had been several times told that Liverpool was a place in which electric light was going out. But this was the explanation he had received: "The central portion of Liverpool, containing all the important streets, is lighted by arc lamps; the outlying portions of the town by incandescent gas. The arc lighting has been gradually increased from time to time till we have now 156 street arc lamps. In no case has the electric lighting been abandoned in favour of gas." In Chester, which was also mentioned, they had 96 arc lamps and 763 incandescent electric lamps in the streets. Mr. Robinson said Alderman Dodsworth had carefully avoided saying anything about the cost, which, he understood, was three times as much as gas. If other people liked to pay three times as much for their light, why should they in York do the same? They were told, when they were asked to allow twelve streets to be lighted with electricity, that it was an established fact that they could do it in that way cheaper than gas. But was it cheaper than gas, and were the streets any better lighted than they could be by incandescent gas? Alderman Dodsworth could always put forward the bright side of a thing; but he (the speaker) should like to hear something about the reverse side. Alderman Agar pointed out that there were arc lamps and arc lamps; and he said that if they went to Liverpool and some of the other towns mentioned, they found a very different light from that of the York lamps, many of which had been a thorough failure. They wanted some improvement, and they also wanted to know the whole cost of one system and the other, as far as they had gone, so that they might see exactly what they were doing.

At a later stage of the proceedings, the subject cropped up again. Referring to the question of cost, Alderman Dodsworth said he was glad to state he was in a position to recommend the Electric Lighting Committee to provide the arc lamps in York in future at a cost of £15 per annum as soon as the number, which was now about 60, reached 100. This was the absolute cost price; and it would be a reduction of something like £5 a lamp on the cost at the start. As to the cost of electric lighting generally, they were suffering a good deal from the misleading information which had been circulated about the city. He was advised that electricity at 6d. per unit was about the same thing as gas at 4s. 6d. per 1000 cubic feet. They had, therefore, been supplying electricity to consumers at a mean price of 4¼d., or the same as gas at 3s. 7d. This was practically one-third more. He considered that they were now in a position to reduce the charges again; and no one had any hesitation in saying that if they could supply enough electricity, they would get it lower than gas. If they started with a thousand new houses, gas could not live with electricity; and when the Committee had about half as many customers as the Gas Company, they could undersell them.

Alderman Dodsworth's statements were replied to in a further letter from Mr. Leaf. With regard to Leyton, he said the reason for mentioning that town was because Mr. Midgley had cited it as one of those which were "lighting the whole of their streets with electricity." In Mr. Leaf's letter, he stated that on the West Ham side of Leyton the majority of the lamps—about 600—were gas-lamps, and that only about 300 ordinary (not incandescent) gas-lamps had been replaced by electric lamps; while on the Lea Bridge side of Leyton about three miles of roads were lighted with gas, compared with one mile with electricity. This, he said, was practically confirmed by the Leyton Electrical Engineer's report to Mr. Dodsworth, which, however, did not support the statement by Mr. Midgley. As to Bradford, Mr. Leaf contended that his statement had been entirely borne out by Alderman Dodsworth's

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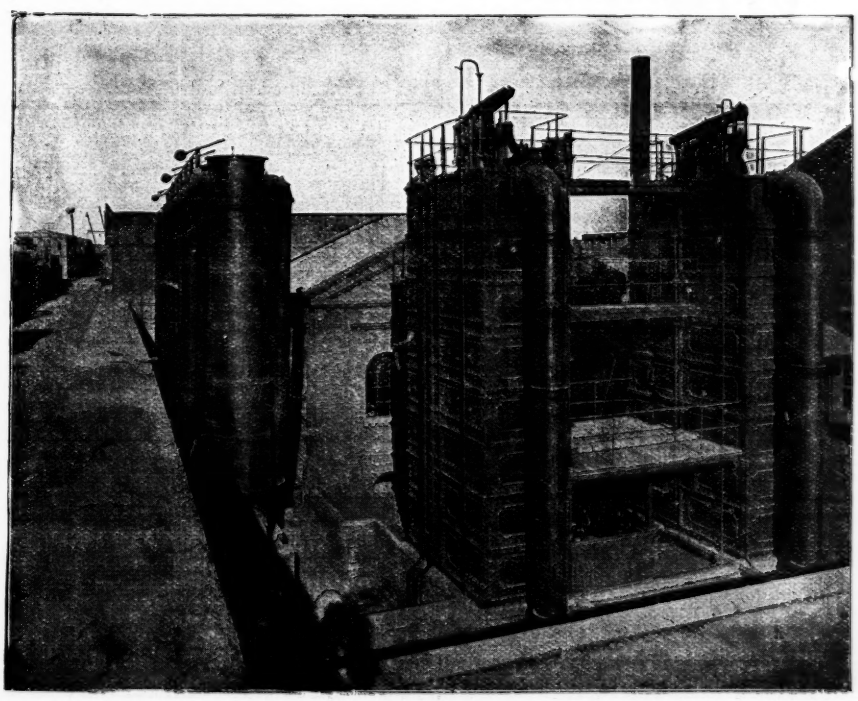

THE ANNULAR CONDENSER FITTED WITH WATER COOLING ARRANGEMENT COOLS DOWN THE GAS TO THE WATER TEMPERATURE IN THIS HOT CLIMATE.

WALKER'S PATENT CONDENSER AND PURIFYING-MACHINE AT SANTIAGO GAS-WORKS.

correspondent. As to Liverpool, Mr. Leaf submitted the fact that the city has 400 miles of streets lighted by gas and 156 arc lamps, and left it to any fair-minded man to say whether incandescent gas or electric arc lighting is in the ascendant. On the larger question of the cost of the electric light, in regard to which Alderman Dodsworth said some "misleading information" had been circulated in the city, Mr. Leaf gave his opponent a few interesting figures. The worthy Alderman had been advised that "supplying electricity at 6d. per unit was the same thing as gas at 4s. 6d. per 1000 cubic feet." Mr. Leaf answered him by submitting the following comparisons:—

(1). Electricity at 6d. per unit, consumed by a 16-candle power glow lamp at the rate of 4 watts per candle power per hour, is equal to 16-candle power gas consumed in a 5-feet argand or flat-flame burner (not incandescent) at 6s. 4¾d. per 1000 cubic feet, and not 4s. 6d. (2). Electricity at 4¼d. per unit, the mean or average price at which Mr. Dodsworth says they have been supplying electricity, is, light for light, equal to gas (not incandescent) at 4s. 6d. per 1000 cubic feet, or twice the present advanced price of York gas at 2s. 3d. (3). Four 16-candle power glow lamps, consuming 256 watts of electricity per hour at 6d. per unit, are equal to 64-candle power of gaslight produced by a Welsbach incandescent "C" burner consuming 4 feet of gas per hour; so that electricity at 6d. per unit is the same thing as incandescent gas at 32s. per 1000 cubic feet. (4). Electricity at 4¼d. per unit is, light for light, equal to incandescent gas at 22s. 8d. per 1000 cubic feet, or ten times the cost of York gas at 2s. 3d.

Here we must leave Mr. Leaf and his opponent.

ELECTRICITY v. GAS AT WARRINGTON.

At the Meeting of the Warrington Town Council on the 7th inst., the following important report by the Borough Surveyor to the Street Improvement and Lighting Committee, on the comparative cost of lighting streets with electricity and gas, was presented.

I have considered the question of cost, and suggest that the basis of calculation should be the cost of lighting per mile of street, and would compare the electric lighting of Sankey Street and Bridge Street with the incandescent light of Wilderspool Causeway. The number of electric arc lamps in Sankey Street to Market Gate, thence down Bridge Street to Friars Green, is 13; this including the two lamps opposite the iron gates to the Town Hall. The distance mentioned is half-a-mile; therefore 26 lamps would be required per mile. The cost charged for electric lighting is £22 per annum per lamp, which makes a total of £572 per mile. The arc lamps are turned out at midnight, and the glow lamps put on, which, of course, do not give the same power as the arc. The incandescent lamps on Wilderspool Causeway are spaced about 65 yards apart, which gives 28 lamps per mile. Taking the lamps to be 300-candle power each, the cost is £7 5s. per annum per lamp, which gives a total cost of £203 per mile per annum burning all night. If the incandescent lights are lowered at midnight, as are the arc lights, the cost per lamp will be £5 10s. or £154 per mile, to which, of course, must be added the man's time for lowering the lights, at (say) 10s. per week—making a total cost per mile per annum of £180. The total candle power per mile of arc lights will be 26 by 2000, equal to 52,000-candle power. The total candle power per mile of incandescent lights will be 28 by 300, equal to 8400-candle power. The cost per candle power per annum for the arc lights is 2·64d., and for the incandescent lights, if lowered at midnight, 5·14d. per candle power.

Alderman SUTTON, in moving the confirmation of the Committee's minutes, alluded to the report. The incandescent gas-light was, he said, only about one-third of the cost of the electric light. The Committee had, therefore, passed a resolution that certain portions of Winwick Street and Winwick Road should be lighted with incandescent gas-lamps. It would be a means of testing which was the preferable light.

Mr. BENNETT seconded the resolution.

Mr. BURTON said the present electric lights were too far apart. The main streets in the borough should have a good light; and the present arrangement seemed to be rather unfair to the business people. Those whose premises were situated in the centre of the electric lamps got very little light; while those opposite them needed little light in their shops.

Mr. TINNION thought that if the incandescent gas-light, which was certainly very good, was so much cheaper than the electric light per lamp, it might be extended.

Mr. GREENING was surprised to see the difference between the two costs was so enormous, judging from the report. He believed the incandescent gas-light was better in the street than the arc lamps. Allusion was made to the intensified gas process (one light outside the gas office); and he said it was the finest light in Warrington.

Mr. BENNETT remarked that if the members would read the report, they would see that, although the electric light might cost more than gas, the light was greater. It was not fair to lose sight of this fact.

Mr. PLUMPTON said the electric lights were too far apart; and if they erected the number that were required, the town would be put to ten times the cost it was now. They had determined to try incandescent gas-light in Winwick Road; and if it suited, they would not carry the electric light much farther.

Alderman BOLTON said it was a matter of cost. The question was whether the electric light was not too powerful. If the lights were doubled, and they had half the power, it would be better.

The DEPUTY-MAYOR thought the basis of comparison was altogether wrong. It seemed to him that the candle power per mile of electric lighting at £572 was equal to the same candle power in incandescent gas-light at £1502.

Alderman SUTTON, in reply, said he thought incandescent gas was the best means of lighting the streets. They found from actual experience that they could have the streets lighted by incandescent gas-lamps at about one-third the cost of the electric light. That was sufficient to go upon; and the Committee had decided to use the incandescent light in Winwick Street and Winwick Road. The Committee were not disposed to spend so much money in connection with the electric light under the circumstances. He had not heard any complaints about the electric lights not being close enough.

The minutes were adopted.

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PORTSMOUTH WATER COMPANY.

Proposed Provisional Order.

The shareholders of the Portsmouth Water Company held an extraordinary meeting last Thursday, to give assent to an application for a Provisional Order, under the Gas and Water Works Facilities Act (1870), to enable them to raise additional capital and to construct works. The Chairman of the Company (Mr. W. Grant, J.P.) presided. In explanation of the proposed Order, Mr. T. A. Bramsdon, the Solicitor, said that authority would be asked to raise £123,000 by shares or stock and £41,000 upon mortgage—a total of £164,000—at a rate of interest not exceeding 5 per cent. Replying to criticism by Mr. Ridoutt, the Chairman said that the need for the new capital was patent from the fact that all the recently raised money was gone. The shareholders must recollect that they had to extend their mains into many new districts; and this could not be accomplished without expenditure. The works to be constructed, too, were of a most important nature, involving an increased supply of water to the Dockyard; the old supply having become insufficient. The Dockyard had been vastly enlarged; the agreement with the Admiralty had been most advantageous so far as the business of the Company was concerned. It was true that the Company did not last year quite earn full dividends; but this was owing to the concessions which were made to the consumers, amounting to £5000. The progress since then, however, had been hardly less than marvellous, as he had explained at the annual meeting. The revenue had already recovered to the extent of £4000; so that they need have no fear with respect to the maximum dividends being maintained. The resolution authorizing the application for the Provisional Order was unanimously carried.

TAMWORTH WATER SUPPLY.

The Alleged Irregularities.

At a Special Meeting of the Tamworth Town Council last month (see "JOURNAL" for Dec. 24, p. 1675), it was decided that the Town Clerk should be instructed to write to the Joint Water-Works Committee stating that serious irregularities in the accounts kept by one of their officials had been reported to members of the Council, and requesting the Committee to direct that a full inquiry be instituted, and an inspection made of the labour books and accounts for the last ten years. This letter was considered by the Water Committee at their meeting last week. Mr. Ridsdale said if an inquiry was necessary, it should be impartial. He proposed that, in response to the request made by the Council, the Committee should express their willingness to ask the Local Government Board to hold an inquiry into the alleged irregularities, on being furnished with the name of the individual implicated. This having been seconded, the Mayor (Mr. F. Alldritt) moved that the request of the Council be granted. He said there was a feeling of intense distrust and dissatisfaction prevalent; and if they themselves did not think well to ask the Local Government Board to hold an inquiry, it would nevertheless be bound to come. After further discussion, the amendment was lost by ten votes to eight; and the Mayor thereupon stated that other steps would be taken for an inquiry to be held.

SHEFFIELD WATER PROFITS AND THE RATES.

The Water Committee of the Sheffield Corporation considered an important matter at their meeting last Wednesday afternoon—viz., the making of a grant from the profits of the water undertaking in relief of the general district rate, under circumstances a little unusual. The only question which appears to have troubled the members was whether such a course could be legally adopted. The Town Clerk advised that the adoption of the proposal was within the power of the Committee; and after discussion, a resolution was passed ordering "That the sum of £13,217 19s. 10d., being the amount paid out of the general district fund in respect of the costs of obtaining the Sheffield Corporation Water Act of 1887, be transferred from the accumulated profits of the water undertaking and applied to the credit of the general district fund, and that the annual charges for interest and sinking fund in respect of the loans raised for payment of the said costs be in future borne and paid by the Water Committee." Referring to this matter, a writer in a local paper says: The Act of Parliament which transferred the water undertaking to the Corporation cost about £14,000; and the district rate has at present to bear an annual charge of about £1000 in respect of that sum. It is quite right that this obligation should be taken over by the now prosperous undertaking on whose behalf it was incurred; but, after all, the benefit to the ratepayers will be hardly appreciable. £1000 a year is something less than a fifth of a penny in the pound; for the yield of a penny rate on Sheffield's annual rateable value is now between £5000 and £6000.

BARNSLEY WATER SCHEME ESTIMATES.

Anticipation and Realization.

A statement made last Tuesday by the Chairman of the Water Committee (Alderman Raley) to the Barnsley Town Council, as to the extraordinary way in which the estimates for the Midhope water scheme have been exceeded, led one of the members to remark that the Council's water estimates were like the Government's war estimates. It is to be hoped the matter is not so bad as all that; but still the position of affairs revealed is sufficiently serious. Alderman Raley pointed out that at the start the estimated cost of the works was £170,000, *plus* parliamentary expenses £15,657—making £185,657 in all. Up to

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September last, £164,934 had been expended; and the estimate of their Engineer (Mr. C. Hawksley) of the amount at that date required to complete the scheme was £122,360. Towards this they had certain sums in hand, which brought the sum required to be borrowed down to £85,637, *plus* an amount agreed to be paid to the Sheffield Corporation of £25,837—making a total of £111,474 needed to complete the works. The increased cost, Alderman Raley remarked, was due to a variety of causes. The estimate was made in 1894; and it was then impossible to foresee the large increase in the cost of materials which had since taken place. The result was a great disappointment to all, but the works were a necessity; and he felt that if the matter came over again, he should still advise the town to go in for the scheme. In spite of this enormous additional outlay, Alderman Raley estimates that by 1915 the income will be equal to the expenditure, and that from that time the concern will be a paying one. It is fervently to be hoped that this "estimate" may prove nearer the mark than the one with regard to the cost of the Midhope Water-Works.

A Local Government Board inquiry was held on Friday into the application of the Council for a Provisional Order empowering them to borrow £120,000 for the completion of the works. It was explained to the Inspector (Major H. P. Boulnois) that the Council were asking for a Provisional Order as this was cheaper than going for an Act of Parliament. Mr. Hawksley stated the reasons for the increased outlay on the scheme; and the Inspector subsequently paid a visit to the works.

LEAD POISONING AT DUKINFIELD.

During the recent drought, some lead poisoning cases occurred at Dukinfield; and the matter was referred to at last week's meeting of the Ashton Joint Water-Works Committee. Alderman Bancroft said that the water up to the point at which the Committee delivered it, was practically free from lead, which was taken up in the service-pipes running to the houses. This only occurred in times of drought, when the water was turned off at night. One of the members had recommended, as a remedy, that householders should let their taps run each morning for ten or fifteen minutes; but he (Alderman Bancroft) thought it would be a very serious thing should this suggestion get abroad. If such advice were generally followed, it would mean a loss in Dukinfield of more than a million gallons of water a week. The Chairman (Alderman J. Wilson) said it was a most improper thing to propose. People could rectify the matter themselves by drawing off the water for culinary purposes at night before going to bed. This would certainly be an equally effective measure; but as it would involve some little extra trouble on the part of the consumers, it seems almost too much to expect that they will adopt it.

Mr. Benjamin Lamb, of Todmorden, has secured the contract for the construction of a new reservoir for Nelson. The total capacity will be 180 million gallons; and the amount of the tender is over £50,000.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

Superannuation is a fancy subject with some public men; it is a fascinating subject with many who are not in the stream of life which is denoted public. One of our greatest publicists has dallied with it for years, receiving not a little of his popularity from his professed interest in the fate which overtakes the toiler when the shades of the weary afternoon of life begin to creep over him. But neither he nor anyone else has been able to produce a scheme which would not lead to greater cost than existing methods of relief entail, or would not do more injustice than there is in leaving present arrangements alone. Hence the barren discussions which periodically take place at public boards. There was one such in the Glasgow Town Council on Thursday. A report of the discussion—which is given on another page—shows how vague and indefinite are the views which are held upon the subject. Even the sponsors for the scheme (which is supposed to exist somewhere) have no clear information as to what is the probable cost which the gratification of their aspirations would amount to. The subject had gone to a Special Committee to consider apparently two things—first, whether a scheme can be instituted which would not be under the Friendly Societies Acts; and, second, whether the whole of the municipal workers cannot be included in the scheme, instead of its being limited to the gas workers. It will probably be months, or it may be years, before it is heard of again. The community have to travel a long way before they can hope to tackle such a large subject in a way which would be satisfactory to the majority of the workers. The ignorance even upon the general aspect of the subject is simply astounding. The idea seems to prevail that in the Government service superannuation is regarded as merely deferred pay. That is what it is not. Employees would very much like it if it were, because upon resignation they would be entitled to payment of all that had been deferred, or, upon death, their representatives would. At present the Government departments are careful not to say what the provision for superannuation is; and if a man does not live to earn it, they retain it for the benefit of others. This is only one of the many thorns which abound in this branch of the public financial tree.

I mentioned the other week that Mr. J. Dick, one of the Town Councillors of Dunfermline, had complained of having been insulted by Mr. A. Waddell, the Gas Engineer and Manager. Subsequently, he sent the following letter to the Town Clerk:—

I think it right to bring the following complaint before the notice of the Gas Commissioners. On Saturday, the 7th inst., I called at the gas-works for the purpose of paying my gas account, and, as I was anxious to obtain some explanations as to the new process or system of enriching the gas, not only for my own information, but for the information of numerous ratepayers who have spoken to me, I inquired for Mr. Waddell. He came out of his room, and after shaking hands and referring to other matters in a friendly way, I asked him if the new process was not likely to be injurious to the

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plant. He thereupon turned to me and said, "I understand you are a bit of an expert in gas making. Don't come down here and teach me to make gas. There's the door." I submit that this is treatment to which, as a Gas Commissioner, I ought not to be subjected; and I must therefore ask the Gas Commissioners to consider my complaint with a view to my obtaining redress by way of apology at least. I think I should have the opportunity of being present at the meeting at which the matter may be considered, and I am quite prepared to meet Mr. Waddell there.

A copy of this letter was sent to Mr. Waddell, who wrote to the Town Clerk in reply:—

I have yours of 26th ult., with copy of Councillor Dick's letter enclosed. Councillor Dick did call and pay his account. On leaving the counter, he said the gas was rotten, then opened the door of my room and asked me to speak with him. We went to another room, where he asked me just one question—viz., "Why the illuminating power meter was being got." This I answered. He then said, among other things, that I was defrauding the public, destroying the plant, and that the gas was rotten. I said he would hardly expect me to agree with him on these points, and asked him to drop them; but as he still continued, I left the room. He followed me, and at the counter threatened what he would do to me at the Council. His manner throughout was most aggressive, and, considering his conduct highly improper, I said to him, "There's the door." I am always glad to see any of the Commissioners at the gas-works, and it is my earnest desire not only to do what is best in the interests of the community, but to maintain cordial relations with your Commissioners. Considering the whole matter, and while much regretting such an incident, I feel that I only did what was unavoidable under the trying circumstances.

Both letters were sent by the Gas Committee to Bailie Harley, the Convener, and the Town Clerk, who were asked to meet with the parties and endeavour to avoid the dispute being further made public. It was found impossible to reconcile the two statements, and witnesses were examined in support of them. Mr. Harley and the Town Clerk reported to a meeting of the Town Council in committee last Monday that the impression which they formed from the evidence was distinctly unfavourable to Mr. Dick's view of the subject. In the Council meeting there was, it is reported, some strong speaking against Mr. Dick's position, who was advised to resile from it; but he declined, saying that he was a truthful man. He was assured that no one doubted his truthfulness, but that he had made a mistake. One member said that, in his opinion, Mr. Waddell would have proved himself unfit for his position if he had not shown Mr. Dick to the door, and that there had been too much listening to underlings by certain people, with a view to getting something to bring against the principal officials. A statement was also made to the effect that Mr. Waddell was not only insulted but assaulted, and an interjection was thrown in about an umbrella. The Council came to the unanimous resolution that the complaint made by Mr. Dick in his letter was quite unjustified. Mr. Waddell's conduct is thus approved of. While, of course, that is well for Mr. Waddell, it is a resolution which will be of equally as much benefit to the Commissioners, because if they had condemned Mr. Waddell, they would have been sanctioning an irregular, and therefore improper, method of bringing forward complaints. The regular way of bringing an official to book is by motion, and not by attending at the office and indulging in persuasive language or action of more or less strength.

Sulphate of ammonia plant was recently introduced into the Corporation gas-works at Hamilton. There seems to be some defect in it, or in it working; for the Gas Committee this week have recommended the Town Council that, "in view of the alterations to the sulphate plant, further consideration of the matter be delayed for a month." Then it is said that Mr. Cassells, at considerable length, moved that the plant be removed from the gas-works; but the motion was not seconded. We shall learn next month what the meaning of the movement really is.

The Corporation of Falkirk would appear, after many days, to have at last got into the way of being able to secure railway service into the site at Thornhill, which they have most favoured for the erection of new gas-works. The Railway Companies have been slow to move in the matter. When, at last, they were got to submit proposals, the plans they prepared showed a number of level crossings upon thoroughfares. This was considered to be objectionable, and the subject was continued for further negotiations. These, it is reported, have been successful, a scheme of railway sidings having been agreed upon which is satisfactory to both parties. This virtually settles the question of the site, as Thornhill is, in other respects, the better of the two places which have been thought of.

Our old friend the self-appointed censor of the gas management in Broughty Ferry has bubbled up again this week. At a meeting of the Town Council on Monday, it was reported that the readings of the photometer on eight different occasions during the past month showed an illuminating power varying from 20·14 to 23 candles. Two days later, a communication from the green-visaged one appeared in the columns of the "Dundee Advertiser" (which seems to be the only print that takes in his effusions), in which he descanted upon what he considers "the steady deterioration in the quality of gas." "Since last month," he goes on to say, "matters have been going from bad to worse; and a further decline is reported in the illuminating power for December." He thinks there should be a searching investigation, and says: "Has Broughty Ferry outgrown the capacity of the main-pipes, and, if so, why has this not been watched and remedied? Is some deleterious substance now mixed with the gas, causing the dull and opaque appearance? Why is the light so very irregular—on some evenings very bad, and other evenings a little less bad?" As to these, it is well known that the main system of pipes is in need of overhauling; being unequal to the carrying of the enormously increased quantity of gas. The other questions the writer puts are as strong pro-coal and anti-oil as I have before observed them to be.

The Town Council of North Berwick have this week resolved to adopt a site at Ferrygate for the erection of new gas-works. The adviser of the Corporation in the matter is Mr. James M'Gilchrist, of Dumbarton. He was in North Berwick on Wednesday, and prepared a report which was submitted to the Town Council in the evening. In it, he showed that the cost of transferring the gas-works to the site

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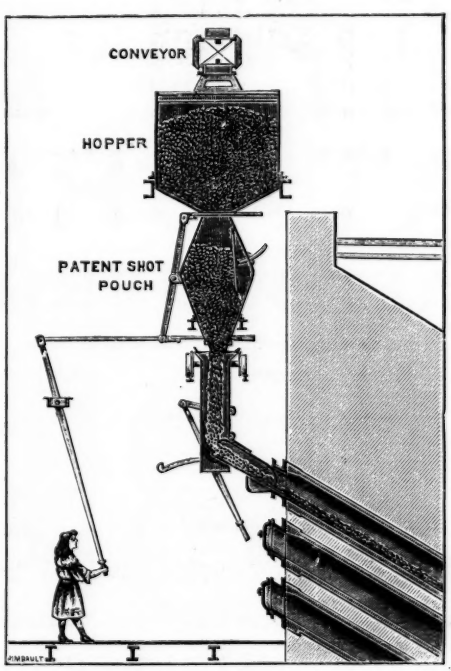

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which had been thought of at Dirleton would be about £6916, and to the site at Ferrygate £2955. With so much less outlay in the case of the Ferrygate site, the Council could not do otherwise than adopt it. The subject of transferring the gas-works has been under the consideration of the Council for several years. The removal of the works is very much wanted; and there should be satisfaction now that something definite has been agreed to.

At a meeting of the Kilsyth Town Council this week, the Gas Manager, Mr. W. Kelloch, reported that the works are almost unable to cope with the demand for gas. If there was the least hitch in the working, it would be serious for the burgh. In 1890, the annual make of gas was 7 million cubic feet; it is now 16 millions. So that it has more than doubled in ten years. The Council instructed the Clerk to ask Mr. A. Yuill, of Alloa, to report upon the condition of the works, with a view to their extension. Among other proposals, there is one for the extension of the railway into the works. It was agreed to hold an exhibition of gas-cookers, and to give a trial to prepayment meters.

The Gas-Works Committee of the Perth Corporation have had before them plans for an extension of the retort-bench and the introduction of a coke-conveyor in their new gas-works, which were prepared by Mr. W. B. M'Lusky, the Engineer. Mr. M'Lusky urged upon the Committee the immediate necessity there was for the proposed extension. The Committee approved of foundations for a retort-bench being laid, which would be of sufficient strength to carry an installation of either horizontal or inclined retorts. When the subject came before the Town Council this week, however, it was remitted for the consideration of the whole Council in Committee.

The Bridge of Earn Gas Company, who have agreed with the Corporation of Perth to take their gas supply from them, require statutory powers before they can implement the transaction. They have given notice of their intention to apply for a Provisional Order; and this week they applied to the Perth County Council for their approval of the measure. The application was formal, and was at once granted.

The bad smell of the gas supplied by the Alyth Gas Company was the subject of conversation in the Alyth Town Council on Tuesday. The Sanitary Inspector reported that in one house in the town it was deplorable, no doubt because of leakage there; and he even went the length of suggesting that they might have to order the Gas Company to stop distributing gas. Happily, the Town Council were more sensible. They contented themselves with an instruction to write to the Gas Company asking them to put the matter right. Doubtless that has been done by this time.

The Water Committee of the Glasgow Corporation have recommended that it be remitted to the Sub-Committee on Works to consider and report as to the advisability of proceeding, as soon as possible, with the construction of the works authorized by the Act of 1885, for taking from Loch Arklet the additional 10 million gallons of water per day sanctioned by the Act; the expediency of obtaining parliamentary powers for taking an additional supply of water from the other sources indicated in the report prepared by the Engineer in 1884; the laying of a new main from the Gorbals Water-Works; and the borrowing of additional money for all or any of these objects, and other purposes of the Water Department. The recommendation came before the Town Council on Thursday last, and was sent to the Sub-Committee. Loch Arklet is a small loch to the south of Loch Katrine, near its western end, where the water supply is taken from the loch; and the further supplies which are contemplated are to be taken from Loch Doine, another small loch which lies considerably to the north of Loch Katrine.

The Corporation of Arbroath are now convinced that a further augmentation of the burgh water supply is necessary. Though they have only recently extended the underground works at the Nolt Loan, which is the sole source of supply, there is only obtained from it sufficient water to meet the domestic requirements of the community, and nothing is left for any emergency which might arise. A meeting of the Water Committee of the Town Council was held yesterday—ex-Bailie Sandeman, the Convener, presiding. The question was fully gone into; and at the conclusion of the discussion, the following resolution was adopted: "That, in view of the increased demand for water, the Committee state to the Council that the time has now arrived at which an augmentation of the present limited water supply has become necessary, and request that the Committee be authorized to call in the services of an eminent engineer to advise what should be done." This recommendation will be dealt with at the next meeting of the Town Council.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Jan.* 18.

Sulphate of Ammonia.

There has been good demand throughout the week, and values have further improved; the closing quotations being £11 3s. 9d. per ton f.o.b. Hull, £11 6s. 3d. per ton f.o.b. Liverpool, and £11 7s. 6d. per ton f.o.b. Leith. Direct buyers have been more in evidence; but they have for the most part been behind the market, and consequently their purchases have been limited. The interest of middlemen has been mainly directed to prompt and near delivery. They would, however, be willing to pay prompt prices for delivery over spring months; but the firm spot market has rendered makers indifferent about selling ahead, unless at some premium. The London quotation, Beckton terms, has been advanced to £11 10s. per ton. Scotch makers have advanced their quotations similarly; but buyers have not responded.

Nitrate of Soda.

This is very firm in all positions; the spot price being 9s. 9d. per cwt. for fine quality.

LONDON, *Jan.* 18.

Tar Products.

The markets generally remain in about the same position. The demand for pitch is very strong, and prices still rule high for prompt delivery. It is reported that negotiations have already been opened

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for delivery all over 1903; but at present consumers are hardly likely to pay existing prices so far forward. 90 per cent. benzol is decidedly quiet; but makers do not appear open to sell all over this year, except at an improved price. 50 to 90 per cent. remains in the same position. Business is reported at 9¼d., January-March. The position of creosote remains unchanged; the demand being very good. Carbolic is a little easier. Business is being done at outports at 1s. 10d. for 60's prompt, although as against this a large quantity is reported to have been placed for home consumption at 1s. 10½d. at makers' works, for delivery up to the end of the year. 50's are scarcely so firm; and business is reported at 1s. 7½d. Crystals remain in the same position, with an absence of demand for 39-40's. As regards tar, one or two large contracts are reported to have been let during the past week at inflated prices, owing to outside competition.

The average values obtaining during the week are: Tar, 15s. 6d. to 18s. 6d. Pitch, east coast, 36s. to 36s. 6d.; London, 38s. to 38s. 6d.; west coast, 34s. to 34s. 6d. Benzol, 90's, 10½d.; 50's, 9d. to 9½d. Toluol, 10d. Crude naphtha, 4¼d. Solvent naphtha, 11d. Heavy naphtha, 10d. Creosote, North, 1⅛d.; London, 1⅝d. Heavy oils, 2⅛d. to 2¼d. Carbolic acid, 60's, 1s. 10d. to 1s. 10½d. Naphthalene, 60s. to 75s.; salts, 25s. to 40s. Anthracene, "A," 2d. to 2¼d.; "B," 1d. to 1¼d.

Sulphate of Ammonia.

The market is still very firm, and the demand is considerable. Beckton have actually sold at £11 10s. for January shipment, and would accept the same price for January-March, although they have very little to spare over this period. Other London Gas Companies are reported to have sold at a little under this for January-February. In Hull, sales have been made at £11 5s. for good makes. Business is reported in Leith at £11 6s. 3d. for prompt, and £11 7s. 6d. for February-March; the demand being specially good from this port. In Liverpool, small sales are reported at £11 5s. to £11 6s. 3d. for prompt. The tone of the market is generally good; and the Continental demand appears to be very strong.

COAL TRADE REPORTS.

Lancashire Coal Trade.

There is still no material change to report in the position of the coal trade throughout Lancashire. Business moved on steadily in all descriptions of round coal; but there is no pressure of demand, and requirements are being met from the output of pits working about five days per week. For house-fire qualities, prices are firm at 15s. 6d. for best Wigan Arley, 13s. to 13s. 6d. for Pemberton four feet and seconds Arley, and 11s. to 11s. 6d. for common house coal at the pit. The lower qualities of round coal are in moderate request for iron-making, steam, and general manufacturing purposes. Prices are not more than steady at recent quotations, 9s. being a very general figure for steam and forge coals at the pit, with 9s. 6d. only obtained for some special sorts. The shipping demand for steam coals continues brisk, and from 10s. 9d. to 11s. 3d. per ton has been received for good qualities, delivered at the Mersey ports. Engine fuel is perhaps rather more plentiful than it has been of late; but this is chiefly in the medium and lower sorts. Of the better qualities of slack, there is still no surplus on the market—in fact, some of the collieries continue rather short of supplies; but the lower descriptions are ample to meet requirements, and common slack still comes in from outside districts at low figures, which keeps down local prices. At the pit, the better qualities of slack average 7s. per ton, with some special sorts fetching 7s. 6d.; and common Lancashire slack ranges from 5s. 3d. and 5s. 6d. for the lower descriptions, to 6s. and 6s. 6d. for good medium sorts. Coke continues in steady demand, with quotations much about the same as those last given; best washed Lancashire furnace cokes averaging 13s. to 14s. per ton, and best foundry qualities 22s. to 24s. at the ovens.

Northern Coal Trade.

The weakness in the coal trade has continued; and there is a lower range of prices for many kinds than when the last report was sent. The steam coal trade has felt the dulness rather sharply, because this is the time when naturally the demand for that class of coal is at its lowest in the North-eastern district. Best Northumbrian steam coals are from 10s. 6d. to 11s. 3d. per ton f.o.b, unscreened steams are 9s., and steam smalls are weak at about 5s. 6d. The collieries are working fairly well; but new orders are rather hard to obtain. In the gas coal trade, the contracts have been settled for Copenhagen; these having been placed with Durham collieries, at prices that are said to be from 9s. 9d. to 10s. per ton f.o.b. But as the contract is one which is at a price delivered, the exact return is dependent on the rate of freights, and may vary. For occasional cargoes of best Durham gas coals, the quotation is about 10s. 9d. per ton f.o.b.; but sales are not so frequent now. Coke is based on selling prices of about 17s. 9d. per ton f.o.b. for export, and 16s. 9d. to 17s. for blast furnace coke. Gas coke is relatively more plentiful, and the weaker tendency of the general trade is influencing the values, though prices are not quoted very different.

Scotch Coal Trade.

Trade runs upon the old lines. Users of coal are afraid to speculate, and consequently new developments are not to be looked for. As in other branches of trade, there is little likelihood of change until after the Budget proposals are known. The prices quoted are: Main 9s. to 9s. 3d. per ton f.o.b. Glasgow, ell 10s. 3d. to 11s. 3d., and splint 11s. to 11s. 6d. The shipments for the week amounted to 127,300 tons—an increase of 24,510 tons upon the previous week, and of 12,734 tons upon the corresponding week of last year. For the year to date, the total shipments have been 217,570 tons—an increase of 2081 tons over the same period of last year.

Our contemporary the "Ironmonger" contained last week an article on "Fitting Gas-Stoves," written by a practical gas-fitter.

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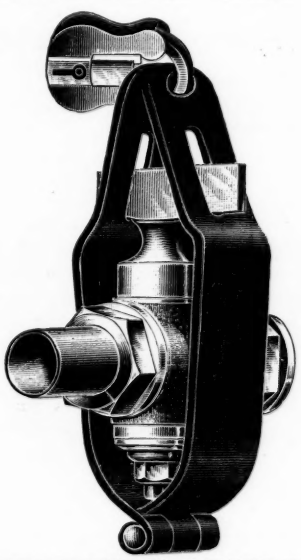

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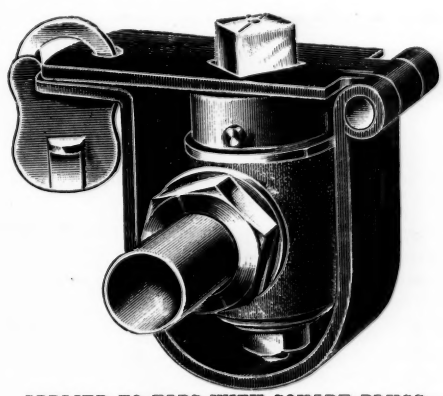

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A Welsbach Lighting Contract.—The Wellington (N.Z.) Harbour Board, after a four months' trial of Welsbach incandescent burners, have entered into a seven years' contract for the lighting by this means of the wharves and buildings under their control. It provides for 132 two-light 140-candle lamps, and 24 three-light 210-candle lamps.

Stokers' Wages at Penrith Gas-Works.—At Thursday's meeting of the Penrith Urban District Council, the Gas Committee reported that they had had under consideration an application from the ten stokers employed at the works, who asked payment for a day-and-a-half for Sunday labour, relief from the weighing of coke, and the employment of a special man in the smithy to repair the tools. A deputation of four men was received. Ultimately, it was agreed that the first two points should be conceded by the Committee, but that the men must continue to look after their own tools in the smithy. This was accepted by the men.

The Explosion at the Carlisle Gas-Works.—At the meeting of the Carlisle Town Council last Tuesday, the Chairman of the Gas Committee (Alderman J. Corbett) gave some further particulars as to the explosion the previous Thursday at the gas-works. He said it was of a serious character; but the results might have been worse than they actually were. There was a tank situated at the bottom of the scrubbers, to collect the ammoniacal liquor which came from them. A man named Culley was employed to ascertain from time to time the quantity of liquor in the tank; and, in order to do so, he had to unscrew a ¾-inch plate. While doing this on the 9th inst., an explosion occurred, and Culley was badly burned about the head and face. The method described of ascertaining the quantity of liquor in the tank was acknowledged to be a primitive one; and a new system would be adopted by which, with floating indicators, the risk of such an accident as had occurred to Culley would be avoided.

Chard Town Council and the Gas Company's Bill.—A meeting of the Chard Town Council was held on Wednesday, for the purpose of considering the question of opposing the Bill which is being promoted by the Chard Gas and Coke Company, Limited, the object of which is to confer authority for the dissolution of the present Company and its reconstruction with extended powers. The Mayor (Alderman F. Harris Mitchell), who presided, stated that the Parliamentary Committee had given a good deal of consideration to the subject, and had had the benefit of the advice of Mr W. A. Valon, who was of opinion that, in the interests of the borough, the Corporation should appear in opposition to the Bill. Mr. Valon, who was present at the meeting, answered questions put by one or two members, and said he considered the Council would not only be doing right in opposing the Bill, but would be wanting in their duty if they did not adopt this course The Council unanimously decided to take action in the matter.

Aberavon Gas Supply.—The annual financial statement of the Aberavon Town Council, which has just been published, shows the gas-works to be a very unremunerative undertaking. The receipts from consumers were £3091, from public lighting £597, and from the sale of residuals £784. On the debit side, no less a sum than £2754 appears for cost of coal; being an increase of £1100 odd over the previous year. Repairs to mains and services, which really included the cost of new services and mains, amounted to the large sum—for so small an undertaking—of £378. Repairs to plant cost £214, and haulage of coal £123. After providing for repayments of principal and interest, there was a loss on the year's working of no less than £1100, of which the rates were called upon to bear £500. The increased cost of coal, the practice of paying for small lengths of mains and new services out of revenue account, and antiquated works are mainly responsible for this condition of affairs. It is hoped, however, that with a new and up-to-date plant, the plans of which are now being prepared by Messrs. Newbigging and Son, the gas-works will be a source of revenue; and instead of the rates being annually called upon, that they will be assisted by the profits of the undertaking.

Dover Water Supply.—The past year's working of the water undertaking has resulted in a profit of £4053. Though the supply is the cheapest in Kent, the profit is equal to a reduction of nearly 6d. in the pound on the local rates.

Southport Gas-Workers' Wages.—It was intimated at the meeting of the Southport Town Council last Tuesday that the foremen at the gas-works were to receive 43s., and not 42s. per week, as was previously stated (*ante*, p. 109); and Mr. Trounson wished to correct the return. He said that in September they paid more than Bolton, Burnley, Lancaster, Rochdale, Warrington, Wigan, Oldham, Blackburn, St. Helens, and Preston. Mr. Barber moved that the paragraph relating to the reduction be referred back, as the Corporation would not be paying the standard rate of wages. Mr. C. Austin wished the undertaking to be worked on business lines, and not made a philanthropic institution. This was why they had such poor returns, and charged 6d. per 1000 cubic feet more than Blackpool, while making less profit. The stokers' wages were reduced from 32s. to 28s., and exhauster men from 34s. to 30s, per week; but they were permanent men. Mr. Trounson said that recently they had done something for their men, a parallel to which they could not find anywhere else in the country—that was, the basis on which they had given them old age pensions. The men had had their best consideration. They had granted them a greater amount than any other town that he knew of. Ultimately, the minutes of the Gas Committee were confirmed; the reductions to take place as stated.

Gas for Heating Baths in Public Institutions.—Arising out of a discussion which took place at the meeting of the Plymouth Town Council yesterday week respecting the supply of hot water for the baths in the Infectious Diseases Hospital, Mr. H. B. Heath, the Secretary to the Plymouth and Stonehouse Gas Company, has addressed to the Town Clerk a letter offering to supply and fit gas-boilers for the purpose. Mr. Heath explains that Mr. P. S. Hoyte, the Engineer to the Company, has made inquiries as to the maximum requirements of the institution. With this knowledge, the Company are prepared to extend, at their own expense, the 10-inch main in Beaumont Road—a neighbouring thoroughfare. From this main, they will lay a 4-inch pipe through the hospital grounds, and fit gas-boilers of a new pattern for each of the pavilions; the boilers being capable of supplying in 10 to 15 minutes about 20 gallons of water at a temperature of from 110° to 120°. The cost of each bath would work out at about 1d., on the basis of gas at 2s. per 1000 cubic feet, the present price in Plymouth. The Company offer to carry out the work at the least possible cost (the total not to exceed £150), and, in case of failure, to remove the plant and claim no payment. They also offer to fit new condensing gas heating-stoves in the various pavilions, on condition that they be hired for three months, and then purchased or discontinued according to the results.

A man named William Guilliam was found on Monday morning of last week in his employer's warehouse in Birmingham with a sack over his head. He had committed suicide by running under the sack an india-rubber pipe leading from a gas-jet, the cock of which had been turned on.

The Birmingham Water Committee are at present engaged (with the assistance of their Engineer, Mr. James Mansergh) in preparing an estimate of the ultimate cost of the water scheme now being carried out. This will be completed, it is hoped, in sufficient time to enable the Committee to report on the matter to the Council, at their meeting on March 4.

Application has been made by the Colwyn Bay Urban District Council to the Prudential Assurance Company for a loan for forty years of a sum of more than £60,000, at 3¾ per cent. This is to take the place of the temporary bank loan by means of which the Gas Company were, on the 1st inst., paid for their undertaking on its transfer to the Council.

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